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Original Article

DRUG UTILIZATION STUDY OF ANTIHYPERGLYCEMIC AGENTS IN OUTPATIENTS AT OPD CLINICS IN SOUTH INDIAN METROPOLITAN CITY

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ABSTRACT

Objective: To determine the drug utilization pattern of anti-diabetic medications in diabetic patients at diabetic outpatient clinics.

Methods: A prospective observational study was conducted to find out the drugs utilization and prescriptions pattern of antihyperglycemic agents in diabetic outpatients in urban Telangana. This study was conducted for a period of six months, known cases of Diabetic Mellitus who were receiving antihyperglycemic medicines as outpatients of either sex of all age groups were included and Patients with gestational diabetes were excluded from the study.

Results: In this study a total number of 250 prescriptions were collected which contained 1674 drugs. Among the prescriptions as an average each prescription contained more than 6.7drugs, this indicates polypharmacy. Among the antidiabetic drugs, metformin was found in a maximum number of prescription i.e. 109 (43.60%) and sitagliptin was found in a minimum number of prescriptions i.e.28 (11.20%) and most of the prescriptions contained antihypertensive agents, analgesics, vitamins and minerals preparations as supplements.

Conclusion: This report alarm all the physicians and health care professionals about various drug interactions and adverse drug reactions which occur due to polypharmacy and also causing a more financial burden to chronic disease patients.

Keywords: Drug utilization, Diabetes, Drug-drug interactions, Adverse drug reactions, DDD-defined daily dosage, ATC-Anatomical Therapeutic Chemical Classification and OPD-outpatient department

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic diseases in which there is the elevation of blood sugar levels over a prolonged period [1]. High blood sugar cause frequent urination, increased thirst and increased hunger. If left untreated, diabetes can cause many complications [2]. Acute complications include diabetic ketoacidosis and hyperosmolar nonketotic coma [3]. Serious long-term complications include cardiovascular disease, stroke, chronic kidney failure, foot ulcers, and damage to the eyes [2].

As of 2013, 382 million people have diabetes worldwide [4]. Type 2 makes up about 90% of the cases [5, 6]. This is equal to 8.3% of the adult population [4] with equal rates in both women and men [6]. As of 2014, an estimated 387 million people have diabetes all over the world [7] with type 2 DM making up about 90% of the cases [4, 5]. From 2012 to 2014, diabetes is estimated to have resulted in 1.5 to 4.9 million deaths each year [7]. Diabetes, at least, doubles a person's risk of death [3]. The number of people with diabetes is expected to rise to 592 million by 2035[7]. The global economic cost of diabetes in 2014 was estimated to be $612 billion USD [4].

The greatest increase in diabetes rates was expected to occur in Asia and Africa, where most people with diabetes will probably live in 2030 [8]. The increase in rates in developing countries follows the trend of urbanization and lifestyle changes, including a "Western-style" diet.

Drug utilization study is a vital segment of pharmacoepidemiology, which describes the amount, quality, and determinants of drug exposure with the ultimate goal to facilitate rational use of drugs in the population [9–12]. Drug therapy is a major component of patient care management in health care settings. Prescribers and consumers are flooded with a vast array of pharmaceutical products with numerous brand names, available often at an unaffordable cost [13]. Irrational and inappropriate use of drugs in health care system notice globally is a major concern [9, 14, 15]. In this regard drug utilization study was undertaken in the diabetic outpatient clinics in urban Telangana state using ATC/defined daily dosage (DDD) system.

MATERIALS AND METHODS

A prospective observational study was carried out a period of six months from various outpatient clinics, hospitals, and pharmacies once the consultation by the physician was over, the prescriptions were copied, and the patients were interviewed as per the WHO guidelines and the following indicators were determined. DDD was calculated as per guidelines for ATC classification and DDD assignment as given by WHO collaborating center for drug statistics methodology, Oslo, Norway.

- Collect information on the diagnosis, drugs prescribed and calculate the mean number of drugs per prescription.
- Calculate the percentage of drugs prescribed the percentage of drugs prescribed by generic name, an average number of prescriptions (mean).
- Analyze the prescriptions for completeness of information as the presence of OPD number, name, age, and sex of the patient, diagnosis, name, dose, and duration of prescribed drugs.
- Percentage of drug prescribed from essential drug list or formulary.

Inclusion criteria

Diabetic patients treating as an outpatient, patients with diabetic & other co-morbid diseases with the various age group.

Exclusion criteria

Patients are unable to communicate, i.e., patients on ventilators or seriously ill patients requiring ICU admissions as well as those unwilling to participate were excluded from the study.

The DDD/1000/day was calculated as follows:

$$\text{DDD/1000 /day} = \frac{\text{Total number of dosage units Prescribed} \times \text{Strength of each dosage unit} \times 1000}{\text{DDD} \times \text{Duration of study} \times \text{Total Sample Size}}$$

RESULTS

A total of 250 prescriptions were collected, which contained 1674 different drugs as included according to the inclusion criteria as mentioned above, out of 250 patients 95.2 % patients were type-2 diabetes and 4.8 % patients were type-1 diabetes. Among the prescriptions on an average each prescription contained 6.7 drugs which indicate polypharmacy. There were males (55%) than females (45%). Most of the prescriptions contained vitamins and minerals preparations as supplements. Among the subcategories of anti-diabetic drugs, Metformin was found in a maximum number of prescription i.e. 109 (43.60%) and sitagliptin was found in a minimum number of prescriptions, i.e.,.28 (11.20%). There were 32.1% patients with diabetics are 61 y and above age projected in fig.1. The DDD/1000/day and the percentage of drugs prescribed were described in the table.1, and the DDD/1000/day maximum value was found to be gliclazide. DDD was calculated as per guidelines for ATC classification and DDD assignment as given by WHO collaborating center for drug statistics methodology, Oslo, Norway.

The prescription pattern of Antidiabetics drugs in a number of Prescriptions is shown in fig.2. The types of antidiabetic drugs prescribed according to age exhibit in table 2. metformin prescribed concomitantly along with other antidiabetic drugs was found more often 27.2% of prescriptions(table.5). 36.8 % of prescriptions were observed to be prescribed with highest in a number of drugs (8 in each) which was reveal in table 6. Only 4.8% of Percent of drugs prescribed by generic Name. Whereas the Percentage of drugs prescribed from National Essential drug list (NEDL)/National Formulary of India (NFI) was 34.18%.

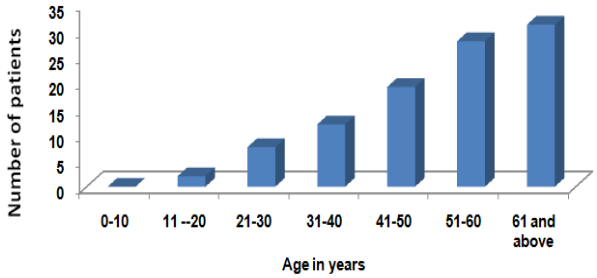

Fig. 1: Patients according to the age groups

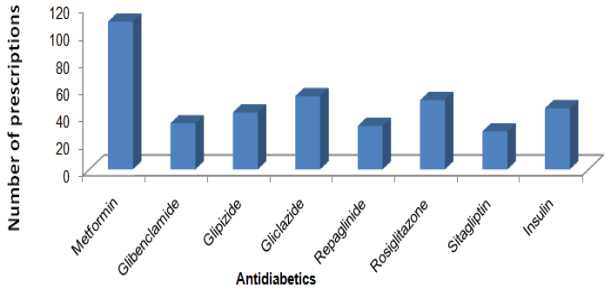

Fig. 2: Types of Antidiabetic drugs prescribed in number of prescriptions

Table 1: The DDD/1000/day and the percentage of drugs prescribed at the diabetic OPD clinics

S. No.	Types of anti-diabetics	No. of prescriptions	Percentage of usage	DDD/1000/day
1	Metformin (Biguanide)	109	43.60	0.33
2	Glibenclamide (Sulfonylurea)	34	13.60	0.66
3	Glipizide (Sulfonylurea)	42	16.80	1.33
4	Gliclazide (Sulfonylurea)	54	21.60	1.78
5	Repaglinide (Meglitinide)	32	12.80	0.67
6	Rosiglitazone (Thiazolidinedione)	51	20.40	0.89
7	Sitagliptin (Dipeptidyl Peptidase-4 Inhibitors)	28	11.2	0.533
8	Insulin	45	18.00	0.625
Total: 6.818				

Table 2: Age distribution of prescriptions according to antidiabetic drugs

Anti-diabetic drugs			Age in years			
Drug names	**ATC codes**	**No. of prescriptions**	**1-20 y**	**21-40 y**	**41-60 y**	**Above 61 y**
Metformin	A10BA02	109	12	22	40	35
Glibenclamide	A10BB01	34	02	08	10	14
Glipizide	A10BB07	42	00	05	27	10
Gliclazide	A10BB09	54	05	10	22	17
Repaglinide	A10BX02	32	00	08	14	10
Rosiglitazone	A10BG02	51	00	11	18	22
Sitagliptin	A10BH01	28	00	08	14	06
Insulin	A10AB01	45	00	06	12	27

Table 3: Gender distribution of prescriptions according to antidiabetics

Anti-diabetics		No. of prescriptions	Gender	
Drugs	**ATC codes**	**Prescriptions (%)**	**Male**	**Female**
Metformin	A10BA02	43.60 (109)	47	62
Glibenclamide	A10BB01	13.60 (34)	14	20
Glipizide	A10BB07	16.80 (42)	23	19
Gliclazide	A10BB09	21.60 (54)	28	26
Repaglinide	A10BX02	12.80 (32)	15	17
Rosiglitazone	A10BG02	20.40 (51)	23	28
Sitagliptin	A10BH01	11.2 (28)	13	15
Insulin	A10AB01	18.00 (45)	28	17

Table 4: Diagnosis of patients receiving antidiabetic

Diagnosis	No. of patients	% of patients	No. of prescriptions
TYPE-1	12	4.8	12
TYPE-2	238	95.2	238

Table 5: Number of occasion's concomitant antidiabetic prescribed in the prescriptions

Drugs	No. of occasions	% occasions (out of total prescriptions)
Metformin	68	27.2
Glibenclamide	23	9.2
Glipizide	18	7.2
Gliclazide	16	6.4
Repaglinide	19	7.6
Rosiglitazone	12	4.8
Sitagliptin	20	8.0
Insulin	54	21.6

Table 6: Number of drugs per prescription

No. of drugs per prescription	No. of prescriptions	No. of drugs	% of prescriptions
1	03	03	1.2
2	06	12	2.4
3	08	24	3.2
4	08	32	3.2
5	12	60	4.8
6	40	240	16
7	81	567	32.4
8	92	736	36.8

$$\text{I. Average drugs per Prescription} = \frac{\text{Total number of drugs}}{\text{Total number of Prescriptions}}$$

$$= \frac{1674}{250} = 6.69 \text{ drugs}$$

Total number of drugs = 1674

Total number of Prescriptions = 250

Average drugs per Prescription = 6.696 drugs

II. Percentage of prescriptions prescribed by generic name

$$= \frac{\text{Total number of generic drugs}}{\text{Total number of Prescriptions}} \times 100$$

$$= \frac{12}{250} \times 100 = 4.8\%$$

DISCUSSION

Drug utilization studies are important for obtaining data about the patterns and quality of use, the determinants of drug use, and the outcomes of use. The WHO drug use indicators are highly standardized and are recommended for inclusion in drug utilization studies [17–19]. The present study attempts mainly to describe the current prescribing pattern and drug utilization with the WHO core prescribing indicators in Outpatient diabetic clinics. For outpatients, DDD/1000/day provides a rough estimate of drug consumptions [22]. The utilization of Gliclazide was 1.78 DDD/1000/day. Total antidiabetic drug consumption in diabetic OPD clinics was 6.818 DDD/1000/day.

Most common antidiabetic prescribed were biguanide (metformin). The newer antidiabetic–Repaglinide and Sitagliptin accounted for the bulk of prescriptions, which followed the global trend towards antidiabetic prescribing. Percentages of prescriptions prescribed by generic name are very less 4.8% (20).

However, prescribing drugs by generic name makes the therapeutic management economic and rational as it evades prescription writing errors and confusion of dispensing of different brand names which sound alike and spell similar [21]. The doses of antidiabetic were decided upon according to the severity of the disease/disorder, starting with low doses and titrating upwards or downwards according to the clinical response and the patients were kept on regular follow-up. In our study, we found that the average drugs per Prescription are 6.696, which is polypharmacy.

Most of the prescriptions contained multivitamins and minerals, analgesics and antiulcer drug preparations as supplements. This report alarm all the physicians and health care professionals about various drug interactions and adverse drug reactions which are occurring due to polypharmacy and also causing a more financial burden to chronic disease patients.

It is advice to prescribe the only optimal drug for the respective disease conditions. There is need of various drug utilization studies should be conducted to rationalize the prescription patron in India, and there should be a vigilance who should monitor the prescriptions before dispensing and to minimize the ADR, drug interactions and decrease the economic burden and also other complications in patients.

Which can be possible only with Clinical pharmacists, so Indian ministry of health should avail the service of a clinical pharmacist in Indian? Which will save the economy of the country and also prevent the morbidity and mortality occur due to irrational drug prescriptions?

CONCLUSION

Our study in Hyderabad has shown that pharmacists can contribute substantially to promote the rational use of medicines, even in resource-limited settings. This, of course, requires strong collaboration between different institutions and commitments of the pharmacists to the cause. Pharmacist medication review, patient counseling and telephone follow-up can minimize the Adverse Drug Reactions. Medication discrepancies before and after discharge were common targets of intervention.

These efforts must include both studies to understand the best methods to reinforce more successfully the appropriate use of medications according to accepted guidelines and innovative tools to support physician decision making and patient compliance.

ABBREVIATION

DM-Diabetes Mellitus, ADR-Adverse Drug Reaction; USD-US Dollar; DDD-defined daily dosage; ATC-Anatomical Therapeutic Chemical Classification; OPD-outpatient department.

WHO–world health organization; ICU–intensive care unit; NEDL-National Essential drug list and NFI-National Formulary of India

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CONFLICT OF INTERESTS

Conflict of interest declared none.

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