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A Prospective Study On Prescribing Pattern and Cost Impact of Antidiabetic Drugs

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ABSTRACT

Diabetes mellitus is a chronic disorder emerging as a major health problem which increases the rate of morbidity and mortality. The study was a prospective, cross sectional, observational study conducted on both inpatients and outpatients of a tertiary hospital in Bangalore, who were diagnosed with type 2 Diabetes mellitus after obtaining the approval from the institutional review board. A suitable data collection form was designed to collect and document the data pertaining to sociodemographic details, treatment , including costs for patients with Diabetes mellitus. Diabetes mellitus was observed to be higher in patients in the age group of 45-64 years, affecting (61%) males and (48.02%) females. We observed that 44 (14.66%) patients were treated with insulin+oral hypoglycemic agents, 159 (53%) were treated with only Insulin while 97(32.66%) patients were prescribed only oral hypoglycemic agents. In our study average number of drugs per prescription was found to be 5.54 ±1.59, and average number of antidiabetic drugs was found to be 1.14±0.59. The mean prescription cost of inpatients for 5 days was found to be 679.24INR for diabetic drugs. For outpatients the mean prescription cost of antidiabetic drugs for 5 days was 98.73INR for antidiabetic drugs. This study has provided baseline data regarding the prescribing pattern in diabetes patients. The use of drugs on the essential medicine list to reduce the cost of treatment and to improve compliance of the patients must be encouraged.

Keywords: Prescribing pattern, antidiabetic drugs, cost, WHO prescribing indicators

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INTRODUCTION

Diabetes, often referred to by doctors as diabetes mellitus, is a chronic condition associated with abnormally high levels of sugar (glucose) in the blood, either because insulin production is inadequate, or because the body's cells do not respond properly to insulin. The normal blood sugar values are as follows: FBS 70-110 mg/dl, PPBS 80-140 mg/dl, GRBS 80-140 mg/dl, and HbA1c below 6.5% [1].Diabetes if uncontrolled can lead to several acute and chronic complications. The complications of diabetes mellitus are far less common and less severe in people who have well-controlled blood sugar levels [2].Drug utilization is defined as an ongoing, authorized systemic quality improvement process that aims to understand how and why drugs are used [3].The results of drug utilization studies (DUS) can suggest modifications in the existing prescribing practices to the prescribers, policy makers as well as drugs and therapeutic committees in order to encourage rational use of drugs. As the number of people with diabetes grows worldwide, the disease takes an ever-increasing proportion of national health care budgets. Without primary prevention, the diabetes epidemic will continue to grow. Even worse, diabetes is projected to become one of the world's main disablers and killers within the next twenty-five years. Immediate action is needed to stem the tide of diabetes and to introduce cost-effective treatment strategies to reverse this trend. Because of its chronic nature, the severity of its complications and the means required to control them, diabetes is a costly disease, not only for the affected individual and his/her family, but also for the health authorities. The costs of diabetes affect everyone, everywhere, but they are not only a financial problem. Intangible costs (pain, anxiety, inconvenience and generally lower quality of life etc.) also have great impact on the lives of patients and their families and are the most difficult to quantify.[4]Despite the availability of various guidelines for the management of diabetes mellitus the treatment varies from physician to physician depending upon the available sources, the hospital set up and the patient related factors such as the age, sex, body mass index, tolerance, the co morbid conditions and economic status. The objective of the study was to assess the pattern of drug use among the diabetic patients , and to assess the mean prescription cost for the diabetic patients at a tertiary care hospital in Bangalore.

MATERIALS AND METHOD

The study was a prospective, cross sectional, observational study conducted on both inpatients and outpatients who were diagnosed with type 2 DM at a tertiary care hospital in Bangalore. The study was conducted for a period of 6 months and was approved by the institutional ethics committee. Verbal consent was obtained from each patient before the interview. The studies were conducted in

all individuals of either sex, aged above 18 years, diagnosed with type 2 diabetes mellitus. Patients with type 1 DM and gestational diabetes mellitus were excluded from the study. Data were extracted from the patient's case sheets, patients'/ attendants' interviews and collected by use of data collection forms. Information related to socio-demographic details of the patients, pertaining to age, gender, family history, education status, smoking and alcohol consumption and BMI were also obtained and recorded. The prescription pattern of antidiabetic drugs was assessed using WHO prescribing indicators.The prescribing indicators that were measured include the average number of drugs prescribed per encounter. This was calculated to measure the degree of polypharmacy. Percentage of drugs prescribed by generic name were calculated to measure the tendency of prescribing by generic name. Percentage of encounters in which an antibiotic was prescribed was calculated to measure the overall use of commonly used and costly forms of drug therapy. Percentage of an encounter with an injection prescribed was calculated to measure the overall level use of commonly overused and costly forms of drug therapy. Percentage of drugs from an essential drug list (EDL) was calculated to measure the degree to which practices conform to a national drug policy as indicated in the national drug list of WHO(2013). The mean prescription cost was calculated for about 5 days for each case, irrespective of the total number of days stayed as in-patients in the ward. The average cost of hypoglycemic agents ,per prescription for 5 days was calculated for outpatients.

RESULTS AND DISCUSSION

Total patients involved in our study population were 300, out of which 183(61%) were males and 117(48.02%) were females. The mean age of patients with type 2 diabetes in our study population was 55.67±12.8 years. Among our study population the highest number of diabetic patients were in the age group of 50-59 years 88(29.3%). Among the 300 patients studied , there were a total of 295 co-existing illnesses such as hypertension , renal failure, cardiac disease, foot ulcer, cellulitis, neurological disorders, respiratory disorders, dyslipidaemia, thyroid disorders, hepatic diseases and anemia. Hypertension was the leading comorbidity in our study group 89(27%). (Table 1)

In this study, an attempt has been made to describe the current prescribing pattern and trend of anti-diabetic drug therapy along with the cost of the therapy for diabetic patients in a tertiary care hospital Bangalore.

Table 1: Distribution of patients according to the comorbidities

Comorbidity condition	Number of patients	Percentage (%)
Hypertension	89	27%
Renal failure	46	15%

Cardiac disease	33	11%
Foot ulcer	10	3%
Cellulitis	17	6%
Neurological disorders	13	4%
Respiratory disorders	27	9%
Dyslipidemia	13	4%
Thyroid disorders	5	2%
Hepatic diseases	26	9%
Anemia	16	5%

In our study 97 (32.33%) of patients were only on OHA, 159 (53%) were on insulin therapy and 44 (14.66%) were on a combination of OHA's and insulin. It was noticed that 44 patients received a combination of insulin with OHA singly or in combination.

Among these patients the most commonly prescribed OHA was metformin, which was preferred as monotherapy as well as for combined therapy as metformin was considered to be safe with regard to the hypoglycemic episodes and it was less expensive as well, thus making it affordable to the economically weak patients in our hospital [5]. This was similar to the study by Jamuna rani et al [6]. In our study OHAs were prescribed as monotherapy in 45 (31.91%) patients. Many patientswere prescribed with combination therapy to control diabetes as it is a progressive metabolic disease which is difficult to control with just one drug. Two drug combinations were prescribed in 91 (64.53%) patients, whereas 3 drug combinations was prescribed to 5 (3.54%)patients.

Biguanides and the sulfonylureas were the most preferred class of OHA's in our study group, of which metformin was commonly prescribed drug either alone or in combination with other antidiabetic agents such as pioglitazone, glimepiride, glipizide respectively, which fulfilled the patients' need and physician's choice(Table 2).

Table 2: Distribution of classes of antidiabetic drugs prescribed in type 2 diabetic patients

Drug groups	Frequency	Percentage
Biguanides		
Metformin	117	50%
Sulfonylureas		
Glimepiride	80	34.18%
Glicazide	24	10.25%
Glibenclamide	8	3.41%
Thiazolidinediones		
Pioglitazone	5	1.28%
A**lpa-glucosidase inhibitors**		
Acarbose	0	0
Voglibose	0	0
Total	234	

In our study the most commonly prescribed fixed drug combination was metformin+ glimepiride (24%). Metformin does not promote weight and has a beneficial effect on several cardiovascular risk factors. Accordingly, metformin is widely regarded as the first drug of choice for most patients with type 2 DM [7]. Our findings was similar to the study reported by Brahmbhatt, et al and Bela Patel et al[5,8]

In our study, prescribing by brand names was more than prescribing by generic names. This may be due to the absence of a hospital formulary and due to the promotion of brands by medical representatives of pharma companies. Tablet glycomet GP 2(56.75%) was the most prescribed brand which is the combination of metformin and glimepiride and is manufactured by US vitamins limited.(Table 3)

Table 3: Distribution of various brands of antidiabetic drugs

Brand Name	Generic Name	Number of Patients (n=300)	Percentage (%)
T. Glycomet GP2	Glimepiride+Metformin	72	24%
T. Glycomet SR	Metformin	20	6.66%
T.Glykind	Glicazide	13	4.33%
T.glucored Forte	Glibenclamide+Metformin	8	2.66%
T.zeformin XR	Metformin	11	3.66%
T.Metsmall	Metformin	5	1.66%
T.Gemer	Glimepiride	3	1%
T. K-po-Gm	Glimepiride+Metformin+ Pioglitazone	5	1.66%
Total		141	

Prescribing by generic name allows flexibility of stocking and dispensing of various brands of a particular drug that are cheaper and are as effective as proprietary brands. This is the basis of essential drug list use[9]. The percentage of generics prescribed in our study (0.84%) is very low and the drug use from essential drug list is 43%. This further emphasizes the need to reduce the cost of medications to patients through increased prescription of drugs in their generic names and reduction in number of drugs per prescription to foster patients' compliance and rational drug prescription without fall in treatment standards towards attaining optimal diabetic control. Some prescription by proprietary names may have resulted from the good relations existing between the physicians and the pharmaceutical sales representatives that market the drugs to hospital[8].

We observed that out of 203 patients who were on insulin, Human regular short acting insulin was the most commonly prescribed and intermediate acting insulin was prescribed least, (Figure 1) which was similar to the study by Agarwal et al.[9]

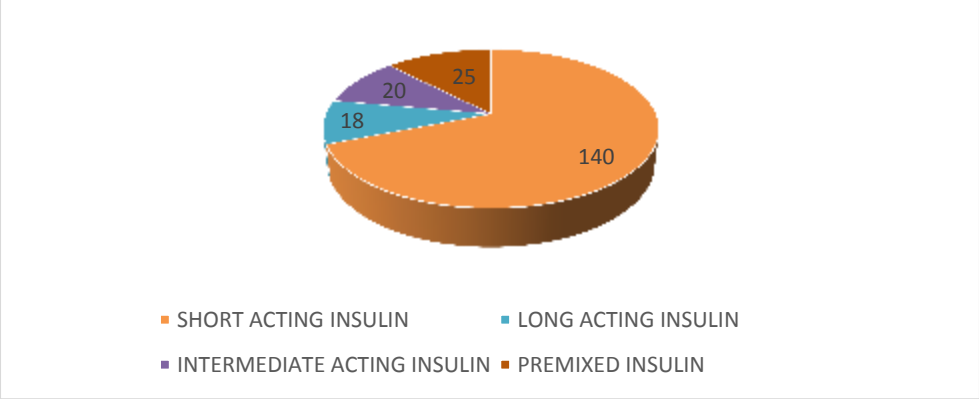

Figure 1: Distribution of various insulin preparations

The most commonly co-prescribed medications along with antidiabetic drugs were antihypertensives(Figure 2). In a study by Kannan et al. also, antihypertensives were the most commonly co-prescribed medications along with antidiabetics[7]. In a study by Bela Patel, et al. antiplatelets were reported to be the most commonly prescribed class of drugs along with antidiabetics[8].

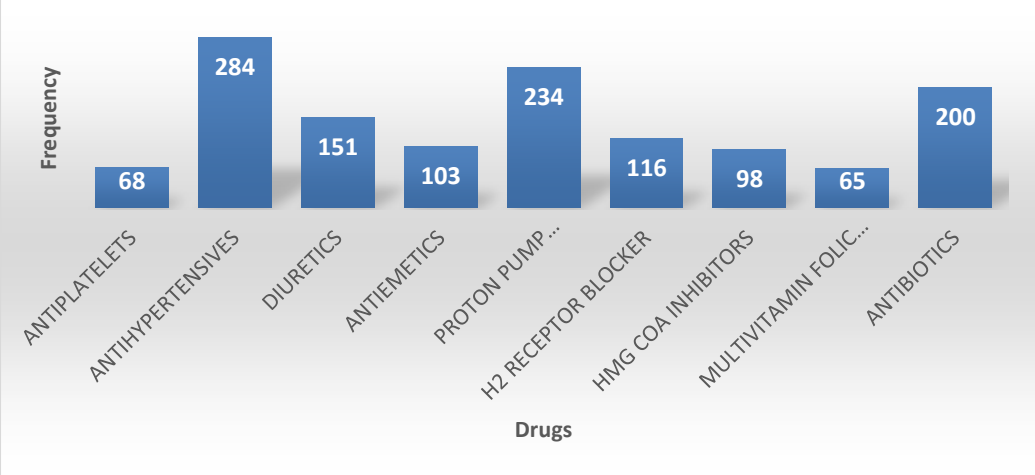

Figure 2: Prescribing pattern of other drugs

The average number of drugs prescribed in our study was 5.54±1.59 per prescription. The selection of the individual agents was made on the basis of their glucose lowering effectiveness and other characteristics suitable to patient's comorbid conditions[5]. Polypharmacy (prescription of more than 5 or more drugs) was observed to be practiced in the management of DM amongst the patients.

A total of 300 prescriptions were collected that contained 1663 drugs. Only 0.84% drugs were written with generic names and 99.15% drugs were written with their brand names. Drugs from WHO- EML (Essential Medicine list's 2013) drugs prescribed were 43%. 21.40% injectable drugs were prescribed.61.66% antibiotic drug were prescribed and 5.05% of fixed dose combinations

were prescribed . In our study average number of drugs per prescription was found to be 5.54 ±1.59, and average number of antidiabetic drugs was found to be 1.14±0.59. (Table 4)

Table 4: WHO prescribing indicators

Prescribing Indicators	Column1	Column2
Parameter	number of drugs	Percentage (%)
Average number of drugs per prescription		5.54±1.59
Number of encounters with an injectable preparation prescribed	356	21.40%
Number of fixed dose combinations prescribed	85	5.05%
Number of drugs prescribed from EML of WHO	148	43.00%
Number of encounters with an antibiotics prescribed	185	61.66%
Number of drugs prescribed by generic name	14	0.84%
Number of drugs prescribed by brand name	1649	99.15%
total	1663	

Cost of prescription is important in chronic disease like diabetes. One of the better approaches to decrease the prescription cost is to prescribe effective and cheaper brands. A study from Nepal reported huge variations in cost of antidiabetic medications and has been documented. A similar finding has been seen in other developing countries. Thus there is a huge scope in reducing the prescription cost by prescribing cheaper alternatives. However, while choosing cheaper brands, one should keep in mind the quality of the brands[7].

Our study showed the mean prescription cost of inpatients for 5 days was 679.24 INR for antidiabetic drugs and treatment cost for other drugs was 973.4 INR. For outpatients the meanprescription cost of antidiabetic drugs for 5 days was 98.73 INR for antidiabetic drugs and18.3 INR for other drugs . Our findings were similar to that reported by Sarumathy S et al [10].The average treatment cost per day for inpatients was 449.52 INR. The average cost of OHA/day/patient was 2 INR, average cost of insulin/day/patient was 133.84 INR, average cost of other drugs/ day/ patient was found to be 194.68 INR. Out of 250 prescriptions 96 prescriptions were of cost 400-600 INR/day and 38 prescriptions were of cost >80 INR/ day.The calculated cost accounted for inpatients includes all drug costs, laboratory cost for diabetic patients (FBS, PPBS, RBS,GRBS, HbA1c), therapy charge and bed charges .The average prescription cost per day for out patients was 31.98 INR. The average cost of OHA is 2.8 INR and average cost of insulin was 169INR. The calculated cost accounted for outpatients includes drug cost, OPDcharges and GRBS charges .

CONCLUSION

This study has provided baseline data regarding the prescribing pattern in diabetes patients in a tertiary care hospital.

Biguanides was the most frequently prescribed OHA.Most of the diabetic patients have comorbid conditions and require more than one medication for their treatment. The use of drugs on the essential medicine list to reduce the cost of treatment and to improve compliance of the patients must be encouraged. The study highlights the need for comprehensive management of diabetic patients, including lifestyle changes, dietary control, hypoglycemic agents, treatment of complications and comorbidities.

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