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PRESCRIBING PATTERN OF ANTIDIABETIC DRUGS AMONG DIABETIC INPATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

This prospective observational study examined the prescribing pattern of antidiabetic drugs in diabetic inpatients. The mean age of the patient population (n=104) was 60.9 years. Majority of the patients were male (77.9%) and in the age group of 61-70 years (40.4%). Diabetic foot complications (84.6%) were the most common co-morbid condition followed by hypertension (78.8%). Insulin was the most commonly prescribed drug during both hospital stay and at the time of discharge (95.2% and 91.3%, respectively) followed by metformin. During hospital stay, 77.9% patients were receiving monotherapy. Among insulin preparations, human neutral soluble insulin was most frequently prescribed. Hypoglycaemia was the most common adverse drug reaction reported. The prescribing trend is in compliance to current guidelines. Insulin thus appears to be the first line therapy in patients with diabetic foot complications, which was one of the most common reasons for hospitalization in the present study.

KEYWORDS: Antidiabetic drugs, diabetes, inpatients, prescribing pattern

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INTRODUCTION

Diabetes is a major public health problem which is associated with the huge economic burden in developing countries like India. According to International Diabetes Federation (IDF), the number of people with diabetes in the world in 2013 was 382 million, which is going to increase to almost 592 million by 2035. It has been predicted that the prevalence of diabetes in the adult population in India will be nearly 6% by the year 2025 [1,2]. Diabetes is associated with significant levels of morbidity and mortality. The acute and chronic complications of diabetes are major causes of hospital admissions. Thus, the chronic hyperglycaemia of diabetes requires proper management to avoid the long term damage, dysfunction and failure of various organs especially the eyes, kidneys, nerves, heart and blood vessels [3,4]. According to World Health Organization, drug utilization is defined as the marketing, distribution, prescription and use of drugs in a society with special emphasis on the resulting medical, social and economic consequences [5]. Drug utilization studies may provide useful insights into the prescribing practices and help to identify whether the pattern of prescribing is in accordance to current treatment guidelines. Hence, the present study was designed to examine the prescribing pattern of antidiabetic drugs among diabetic inpatients in a tertiary care teaching hospital. Secondly, adverse drug reactions (ADRs) related to antidiabetic drugs were also monitored during hospital stay.

MATERIALS AND METHODS

This prospective observational study was conducted over a period of three months (January-March 2013) in adult diabetic patients (either newly diagnosed or known cases) of either sex admitted in the departments of either General Medicine or Endocrinology at Amrita Institute of Medical Sciences and Research Centre (AIMS), a tertiary care, teaching and super-specialty referral hospital in Kochi. The study was approved by the Institutional Ethics Committee. Patients with any malignancy; pregnant and lactating females were excluded. Patient data relevant to the study were obtained by examination of patient's medical records, direct interview of the patient or his/her caregivers and the hospital information system. The data were recorded in standard data collection forms. Details about demography, medical history, duration of diabetes, family history of diabetes, and antidiabetic drug prescribing pattern during both hospital stay and at the time of discharge, were collected. The ADRs related to antidiabetic drugs were monitored and documented in suitably designed ADR monitoring forms. The severity and causality of the ADR was also assessed. The severity of ADR was categorized as mild, moderate or severe as per standard definitions. The causality assessment of ADRs was done as per Naranjo scale.

RESULTS

During the study period, 104 diabetic patients admitted to the Endocrinology or General Medicine departments were analysed. The characteristics of the studied patients are presented in Table I. Males predominated in the present study (77.9%). The mean age of the patient population was 60.9 years (age range: 22-87 years). Majority of the patients were in the age group of 61-70 years (40.4%) followed by 51-60 years (22.1%). The study population comprised of 100 type 2 diabetic patients and four type 1 diabetic patients. Among the type 2 diabetic patients, 28 patients had a positive family history, and 29 patients had a negative family history. The details regarding the family history of 43 patients were not available. Among the type 1 diabetic patients, one had a positive family history while two had negative family history. One patient's family history data was not available. Most of the patients (24%) had diabetic history of 11-15 years followed by 16-20 years (20.2%). There were four newly diagnosed cases. The data on diabetic history was not available for three patients.

Table I
Characteristics of the studied population

Characteristic	Number of patients (%)
Gender	
Male	81 (77.9)
Female	23 (22.1)
Age group (years)	
18-30	4 (3.8)
31-40	2 (1.9)
41-50	13 (12.5)
51-60	23 (22.1)
61-70	42 (40.4)
71-80	18 (17.3)
81-90	2 (1.9)
Diabetic history (years)	
0-5	12 (11.5)
6-10	20 (19.2)
11-15	25 (24)
16-20	21 (20.2)
21-25	5 (4.8)
26-30	14 (13.5)
31-35	1 (1)
36-40	3 (2.9)

In our study, all the patients had a co-morbid condition. Two patients (1.9%) had a single co-morbid condition and 102 patients (98.1%) had more than one co-morbid condition. Majority of the patients were suffering from six co-morbid conditions (28.8%). Diabetic foot complications (84.6%) were the most common co-morbid condition followed by hypertension (78.8%). The most common diabetic foot complication was the non-healing ulcer found in 53 patients (51%), followed by cellulitis (13.5%), gangrene (12.5%) and abscess (10.6%). Osteomyelitis and necrotizing fasciitis were observed in 5.8% and 4.8% patients, respectively. Other diabetic complications like neuropathy, nephropathy and retinopathy were found in 74 patients (71.2%), 35 patients (33.6%) and 22 patients (21.2%), respectively. Thirty seven patients (35.6%) required amputation. Majority of the amputations were seen in patients above the age of 60 years (25 of the 37 cases). Fourteen of the admitted patients had a previous history of amputation. The average hospital stay for patients undergoing amputations was 16.2 days (range 5-31 days). Patients with more than 20 days of hospital stay had three or more co-morbid conditions. The average number of antidiabetic drugs prescribed per patient was 1.28. Insulin was the most commonly prescribed antidiabetic drug during both hospital stay and at the time of discharge (95.2% and 91.3%, respectively). All the type 1 and 95 of the type 2 diabetic patients were on insulin therapy. The other prescribed drugs included, in order of decreasing frequency, metformin, sulfonylureas, dipeptidyl peptidase – 4 (DPP-4) inhibitors and voglibose. Table II shows the utilization pattern of antidiabetic drugs during hospital stay and at the time of discharge.

Table II
Utilization pattern of antidiabetic drugs during hospital stay and at discharge

Class	Drug	Hospital stay	Discharge
Insulin	Insulin	99 (95.2)	95 (91.3)
Biguanides	Metformin	23 (22.1)	33 (31.7)
Sulfonylureas	Glimepiride	5 (4.8)	7 (6.7)
	Glibenclamide	2 (1.9)	2 (1.9)
	Glipizide	1 (1.0)	1 (1.0)
	Total	**8 (7.7)**	**10 (9.6)**
Dipeptidyl peptidase - 4 inhibitors	Vildagliptin	1 (1.0)	1 (1.0)
	Linagliptin	1 (1.0)	1 (1.0)
	Sitagliptin	0 (0)	1 (1.0)
	Total	**2 (1.9)**	**3 (2.9)**
Alpha glucosidase inhibitor	Voglibose	1 (1.0)	1 (1.0)

Values represent number of patients (%)

In the present study, the majority of the patients were on monotherapy during both hospital stay and at the time of discharge (77.9% and 62.5%, respectively). In monotherapy, most patients were receiving insulin during hospital stay (76.9%) and at the time of discharge (62.5%). Among the insulin preparations, majority of the patients were using human neutral soluble insulin, as shown in Table III. Only one patient received metformin as monotherapy during hospital stay.

Table III
Insulin preparations used during hospital stay and at discharge

Type of insulin	Hospital stay	Discharge
Human neutral soluble insulin	81 (77.9)	79 (76)
Isophane human insulin	61 (58.6)	56 (53.8)
Biphasic isophane human insulin	33 (31.7)	31 (29.8)
Insulin glargine	4 (3.8)	5 (4.8)
Insulin aspart	3 (2.9)	4 (3.8)
Insulin lispro	1 (1.0)	1 (1.0)

Values represent number of patients (%)

In patients receiving combination therapy, two drug regimens were most commonly prescribed. They were prescribed less frequently during hospital stay (17.3%) than at the time of discharge (27.9%). Metformin + insulin was the most prescribed combination (12.5% and 21.2% during hospital stay and at the time of discharge, respectively) followed by glimepiride + metformin (2.9%) and glibenclamide + metformin (1%). Three drug regimen were received by four patients (3.8%) during hospital stay and five patients (4.8%) at the time of discharge. Insulin and metformin were a part of all the three drug combinations. Four drug regimen was prescribed in only one patient during hospital stay and at the time of discharge. This patient received glimepiride + metformin + insulin + linagliptin. Five ADRs were observed during the study. Hypoglycaemia was the most common ADR observed. All the ADRs were of moderate severity and were probably related to the antidiabetic drug.

DISCUSSION

Diabetes mellitus is a chronic disease whose prevalence is increasing at an alarming rate in India. Proper management of diabetes is of prime importance since it increases the risk for disorders that predispose individuals to hospitalizations, including nephropathy, infection, lower extremity amputations etc. Hence, the present study aimed to evaluate the prescription trend of antidiabetic drugs in diabetic inpatients. A total of 104 diabetic patients were evaluated during the study period. In the present study, male preponderance was seen which is in agreement with the results of various other studies from India [6-9]. However, two studies from south India have reported a slight female preponderance [10,11].Majority of our patients were in the age group of 61-70 years which is in concordance with the earlier published literature [6]. However, few other studies from India have reported a higher proportion of patients in the age group of 51-60 years [8,9,12]. The mean age of patients in the present study was 60.9 years, which is slightly higher than that reported in other studies carried out in south India which have reported a mean of nearly 56 years [7,8]. In the present study, most of the patients had a diabetic history of 11-15 years. Another study from south India has reported more hospitalizations in patients with a diabetic history of 6-10 years [9]. This highlights the fact that patients above the age of 50 years and those with a long diabetic history are at high risk for developing diabetic complications that can result in hospitalizations. Co-morbidity has been shown to intensify health care utilization and to increase medical care costs for patients with diabetes. In our study, all the patients had a co-morbid condition with the majority suffering from more than one co-morbid condition. However, in another study from south India, around 80% patients suffered from a co-morbid condition with majority suffering from one co-morbid condition which is in contrast to our study [7]. Ulceration, infection, gangrene, and lower extremity amputation are complications often encountered in patients with diabetes mellitus. These complications frequently result in extensive morbidity, repeated hospitalizations, and mortality. Routine ulcer care, treatment of infections, amputations and hospitalizations cost billions every year and place a tremendous burden on the health care system [13]. In the present study, diabetic foot complications were observed in nearly 85% patients with majority suffering from non-healing ulcer. The prevalence of diabetic foot complications in our study appears to be comparatively higher in comparison to other studies from India which have reported a prevalence of 6-8% [6,8,10]. Diabetic foot disease is a result of three main pathologies, which can occur singly or in combination. These are peripheral neuropathy, peripheral arterial disease and infection. In the present study, 70 patients (67.3%) had both neuropathy and foot complications. Peripheral occlusive vascular disease was present in 45 patients (43.3%). Hypertension was observed in nearly 79% patients. The prevalence of hypertension has ranged from 8-53.5% in different studies across India [6-9,11]. The combination of hypertension and diabetes is clinically important since it magnifies the risk of diabetic complications. In the present study, the average number of antidiabetic drugs prescribed was 1.28 which is slightly more than previously recorded (0.94) from another study conducted in south India [7]. Majority of the patients were on monotherapy, which is consistent with previous literature [10,11]. Insulin was the most commonly prescribed antidiabetic drug (95%) followed by metformin (22%). In another study from Kerala also, insulin was the most frequently prescribed drug (80.5%) followed by biguanides (23%) [11]. This is consistent with current guidelines which consider insulin as the best treatment option for inpatient management [14]. Dual therapy was prescribed less frequently during hospital stay than at the time of discharge, a finding similar to earlier published literature [7]. However, in that study the combination of metformin and sulfonylurea was prescribed more often, while in our study the combination of metformin and insulin was prescribed more. In a study by Kumar et al [10], the most prescribed combination was metformin + insulin.

CONCLUSION

This study shows that the prescribing trend has been monotherapy with insulin which is in compliance to current guidelines. Insulin thus appears to be the first line therapy in patients with diabetic foot complications, which was one of the most common reason for hospitalization in the present study. However, larger studies in the near future with proper follow up may allow to better analyse the number of patients who are actually able to achieve the desired glycemic targets.

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CONFLICT OF INTEREST

Conflict of interest declared none.

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