Retrospective prescription-based survey in type 2 diabetes in an Indian tertiary care hospital

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ABSTRACT

The guidelines for the treatment of type 2 diabetes have increasingly favored tighter glycemic control, necessitating the use of more aggressive pharmacological therapy. The objective of this study was to describe trends in the prescription of anti-diabetic medications among in-patients with type 2 diabetes. The study included 130 patients who had diabetes mellitus 2, were of either sex, any age, and had been undergoing treatment at tertiary care teaching hospital, Bangalore. A data was compiled from the medication usage records maintained by the hospital. Data were analyzed using SPSS 13.0 (SPSS Inc., Chicago, Illinois, United States of America). Student's t-test and analysis of variance (ANOVA) were employed to compare quantitative variables, and the chi-square test was applied to compare categorical variables. Results indicate that 58.46% of the study population was male patients, out of which 55.26% were having history of either smoking or alcohol. The prevalence of diabetes was observed more in the population taking non-vegetarian diet. Most common disease associated with diabetes mellitus was found to be hypertension (45.38%). Highest prevalence of disease was found to be in the age group of 51 to 60 yrs (28.46%). Highest prescribed antidiabetic agent is insulin followed by metformin and then glimepiride. In combinational therapy metformin and glimepiride is the maximum prescribed combination. The study indicated that the choice of anti-diabetic drugs remained more or less unchanged compared to previous studies. The study also revealed the common use of metformin and glimepiride along with insulin treatment for in-patients. The study provides baseline data for carrying out further therapeutic audit with more parameters of analysis which in turn will provide regular feedback to researchers and prescribers. This may encourage rational prescribing in type 2 diabetes mellitus.

Keywords: diabetes mellitus; analysis of variance: combinational therapy.

INTRODUCTION

Diabetes mellitus is one of the most common endocrine diseases in all populations and all age groups. It is a syndrome of disturbed intermediary metabolism caused by inadequate insulin secretion or impaired insulin action, or both. Diabetes is crudely grouped into the two types-insulin dependent diabetes mellitus and non-insulin dependent diabetes mellitus (Mohan *et al.,* 2007, Huizinga *et al.,* 2006). Both types are associated with excessive morbidity and mortality. Relative mortality in people with insulin dependent diabetes is between 10 and 30 (equal to a 5-10 year reduction in life expectancy), depending on the age at diagnosis, current age, the duration of the disease, and the year of diagnosis. India has largest number of diabetic subjects in the world and thus being termed the "diabetes capital of the world". According to the Diabetes Atlas 2006

published by the International Diabetes Federation, the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken (Mohan *et al.,* 2007, Wild *et al.,* 2004)

The National Urban Diabetes Survey (NUDS), a population based study was conducted in six metropolitan cities across India and recruited 11,216 subjects aged 20 years and above representative of all socioeconomic strata. An oral glucose tolerance test was done using capillary glucose and diabetes was defined using the WHO criteria. The study reported that the age standardized prevalence of type 2 diabetes was 12.1 per cent. This study also revealed that the prevalence in the southern part of India to be higher-13.5 per cent in Chennai, 12.4 per cent, in Bangalore, and 16.6 per cent Hyderabad; compared to eastern India (Kolkatta), 11.7 per cent; northern India (New Delhi), 11.6 per cent; and western India (Mumbai), 9.3 per cent. The study also suggested that there was a large pool of subjects with impaired glucose tolerance (IGT), 14 per cent with a high risk of conversion to diabetes (Mohan *et al.,* 2007, Gupta *et al.,* 2007).

The pathogenesis of type 2 diabetes (non-insulin dependent diabetes mellitus) is complex involving progressive development of insulin resistance in liver and peripheral tissues accompanied by a defective insulin secretion from pancreatic beta cells leading to overt hyperglycaemia (an abnormally high amount of glucose levels in blood) (Mohan *et al.,* 2007). Despite genetic predisposition, the risk of developing type 2 diabetes in humans increases with age, obesity, cardiovascular disease (hypertension, dyslipidaemia) and a lack of physical activity (Mohan *et al.,* 2007, Huizinga *et al.,* 2006). Generally, current therapeutic strategies for type 2 diabetes are limited and involve insulin and four main classes of oral antidiabetic agents that stimulate pancreatic insulin secretion (sulphonylureas and rapid-acting secretagogues/insulinotropics *e.g.,* glibenclamide, glipizide, rapaglinide), reduce hepatic glucose production (biguanides *e.g.,* metformin), delay digestion and absorption of intestinal carbohydrate (a-glucosidase inhibitors *e.g.,* acarbose) or improve insulin action [thiazolidinediones (TZDs) *e.g.,* pioglitazone, rosiglitazone] (Ramchandra *et al.,* 2002).

The present study was conducted to establish the current prescribing pattern of antidiabetic drugs in inpatient pharmacy department in a tertiary care teaching hospital, Bangalore. Drug selection indicators selected for present study include percentage of male and female patients, number and percentage in various age groups, percentage of one/two drug combination, type of dosage form, percentage of the utilization of different categories of the antidiabetic drugs and percentage of antidiabetic drugs in combination with other category drugs.

MATERIAL AND METHODS

Design: Retrospective prescription-based survey using prescriptions (around 130) of Inpatients conducted from 1st June to 31st August 2009 in a tertiary care teaching hospital, Bangalore.

Inclusion and Exclusion Criteria: All the diabetes patients who visited the inpatient medicine department during the study period were enrolled in the study.

Operational modality: Patients were enrolled in the study after getting a verbal informed consent. The details were entered in the structured patient profile form.

Patients: Patients with type 2 diabetes mellitus with or without any complications or illness were included in the present study. The study was restricted to medicine department of the hospital. Case collection was done through taking the necessary data in the accurately and precisely designed patient profile form. The patient profile form was designed in such a way that, it includes the information regarding patient's demographic data, laboratory data related to diabetes mellitus, and prescription (treatment given).

Analysis of Prescriptions: The filled patient profile form was analysed for various parameters like age distribution and gender of patients, duration of diabetes, concurrent illness, presence of diabetic complications, history of habit, number of drugs per prescription, average number of drugs prescribed, therapeutic category of drugs, class of antidiabetics, types of insulin preparations used, dosage form, duration of therapy and the prescribing indicators.

RESULTS

The study revealed that 76 (58.46%) patients were male patients, out of which 42 (55.26%) had habit of either smoking or alcohol consumption (Table 1). Study showed that 42.3% prescriptions contained single antidiabetic drug, out of which 94.54 % prescriptions consists insulin (Table 2). Totally 245 drugs were prescribed in 130 prescriptions, in which insulin 86.15% (in 112 prescriptions) was found to be maximum prescribed drug. Further metformin in 53.84% prescription and glimepiride in 32.30% were found to be maximum among various available oral hypoglycemic drugs. We found out that only three class of oral-hypoglycemic agents (Figure 1) were in use as follow: Biguanides-70(53.84% prescriptions), sulphonylurea-55(42.30%), and thiazolidinediones-8(6.15%). Most common disease associated with diabetes mellitus was found to be hypertension (45.38%) (Table 3). Highest prevalence of disease was found to be in the age group of 51 to 60 yrs (28.46%) followed by age group of 61 to 70 yrs (25.38%) as shown in table 1. The significant number of patients were non-vegetarian (Table-3) . Among the study population, forty eight had both the parents

**Table 1: Age and sex distribution of diabetic patients**

Age Groups (Years)	Men		Women		Total	
	No. of patients	%	No. of patients	%	No. of patients	%
1-20	0	0.00	0	0.00	0	0.00
21-30	0	0.00	0	0.00	0	0.00
31-40	6	7.89	6	11.11	12	9.23
41-50	22	28.95	10	18.52	32	24.62
51-60	20	26.32	17	31.48	37	28.46
61-70	17	22.37	16	29.63	33	25.38
71-80	9	11.84	4	7.41	13	10.00
81 & above	2	2.63	1	1.85	3	2.31
Total	**76**	100	**54**	100	**130**	100

Table 2: Number of anti diabetic drugs prescribed per prescription

No. of Drugs per prescription	No. of Prescrip-tions	No. of prescriptions containing oral antidiabetics	No. of prescriptions consisting insulin with or without oral antidiabetics
0	6	0	0
1	55(42.30%)	3	52
2	28	28	18
3	33	33	33
4	6	6	6
5	2	2	2
Total	**130**	**72**	**111**

Table 3: Gender, habit, complications reported and diet of in diabetic patients

Gender & Habit	Complications report
Male	**76(58.46%)**
No habits	34
Smoking	21
Alcoholism	21
Female	**54 (41.53%)**
No habit in female	
Complications	**Cases**
Nephropathy	6
Neuropathy	7
Ketoacidosis	2
Diabetic foot	2
Hypertension	59
Type of diet	**No. of patients**
Vegetarian	15
Non-vegetarian(mixed)	105
Not mentioned	10
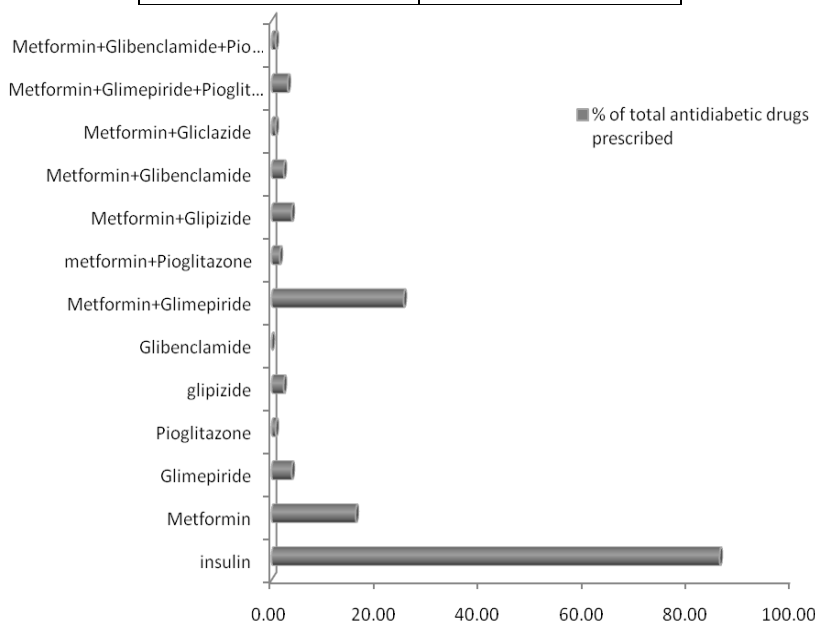
Figure 1: Percentage of drugs prescribed in prescription

suffering from diabetes. Twenty five patients had their father alone and thirty three had their mother alone suffering from diabetes.

DISCUSSION

A recent study has shown how increasing awareness and empowerment of community can possibly help in the prevention of diabetes and other non communicable disorders. In this work we have studied the prescription patterns of diabetes type 2 for Inpatients in a tertiary care teaching hospital. The study has revealed that use of insulin in inpatients is increased, and metformin is being preferred over sulfonylureas, whereas use of other class of drug is minute/negligible. In-

creased usage of insulin is believed to be due to (1) severity of the disease, (2) presence of co-morbidities and (3) the fact that most of the cases were critical at the time of admission (urgent need to control GRBS). Our study results clearly shows that metformin has replaced the usage of sulfonylurea to the large extend which is believed to be due to mainly two reasons: (1) Metformin does not causes weight gain where as others Oral Hypoglycemic Agent (OHA) does. (2) It does not cause hypoglycemia. Absence of these two ADR caused by other therapeutic alternatives makes metformin more beneficial treatment option among all the OHA. Moreover, the cost of Metformin is very low, thus making it affordable by the patients.

Further, elderly patients are at greater risk of developing type-2 diabetes mellitus (DM). The disease prevalence in case of female subjects was found to be lower in age group of 41-50 yrs whereas higher in age group of 51-60 yrs and 61-70 yrs compare to male subjects. This difference is believed to be due to hormonal changes in women after menopause.

CONCLUSION

The study indicated that the choice of anti-diabetic drugs remained more or less unchanged compared to previous studies. Type 2 diabetes mellitus is most common in patients aged between 51-60 years and those who are taking non vegetarian meals. The study also revealed the common use of metformin and glimepiride along with insulin treatment for in-patients. The study provides baseline data for carrying out further therapeutic audit with more parameters of analysis which in turn will provide regular feedback to researchers and prescribers. This may encourage rational prescribing in type 2 diabetes mellitus.

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