



EVALUATION OF THE UTILIZATION OF ORAL HYPOGLYCEMIC DRUGS IN DIABETIC TYPE 2 OUTPATIENT CLINIC OF A TEACHING HOSPITAL IN NORTH INDIA



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Abstract

Diabetes Mellitus is a metabolic disorder characterized by the presence of hyperglycaemia due to defective insulin secretion, insulin action or both. The estimated number of people with diabetes registered in India was 50.8 million in the 2010 and diabetes will be affecting 87 million persons by 2030. A prospective cross-sectional study was conducted in the outpatient Department of Medicine in "TEERTHANKER MAHAVEER HOSPITAL", Moradabad, U.P. Proper informed consent was obtained from all patients. Among all the drugs prescribed to Type 2 DM patients, 43.4% were found to be anti-diabetic drugs. The most prescribed drugs were sulphonylureas (50.4%). Biguanides were the second most prescribed drugs (46.6%). In our study, maximum patients were prescribed combination therapy of two or more oral anti diabetic drugs (44.7%). A firm conclusion of this study strongly highlights the need for patient education or counseling on use of antidiabetic and concomitant drugs, monitoring of blood glucose and glycosylated haemoglobin (HbA1c) levels, dietary modification with low calorie food, and correction of diabetic complications.

INTRODUCTION

Diabetes Mellitus is a metabolic disorder characterized by the presence of hyperglycaemia due to defective insulin secretion, insulin action or both. The chronic hyperglycaemia of DM is associated with significant long-term sequel, particularly damage, dysfunction and failure of various organs-especially kidneys, eyes, nerves, heart and blood vessels ^[1].

In 1980, the WHO proposed a classification of DM based on the recommendations of the **US National Diabetes Data Group**. This classification reflected advances in understanding of the aetiology and pathogenesis of diabetes. The descriptive terms “juvenile onset & maturity onset were replaced with insulin & non-insulin dependent diabetes respectively”. A new category – IGT – was also introduced to describe the intermediate zone of diagnostic uncertainty between normal glucose tolerance and diabetes. In 1997, the ADA again reclassified diabetes, revised the diagnostic criteria and introduced another new category- IFG. This most recent classification attempts to categorize according to disease aetiology rather than

treatment. The WHO revised its 1980/1985 classification and proposed the above classification, at about the same time.

Maturity onset (Type 2 Diabetes) or Non-insulin dependent diabetes

Obese individuals constitute the majority of the diabetic population and 60-90% of the Type 2 diabetic population. Patients with Type 2 diabetes have defects in insulin secretion, tissue responsiveness to insulin, and hepatic glucose production ^[4].

Obesity is linked with higher risk for several serious health conditions, such as hypertension, Type 2 diabetes, hypercholesterolemia, coronary heart disease (CHD), stroke, asthma, and arthritis. Direct medical spending on diagnosis and treatment of these conditions, therefore, is likely to increase with rising obesity levels ^[7].

Prevalence of Diabetes Mellitus:

The estimated number of people with diabetes registered in India was 50.8 million in the 2010 and diabetes will be affecting 87 million persons by 2030. Current estimates revealed that there are at least 150 million people living with diabetes worldwide of

which two-third is from developing countries^[9].

Diagnosis of Type 2 Diabetes Mellitus

WHO (1999) Criteria for the Diagnosis of Diabetes Mellitus (ICMR guidelines also have the same diagnostic criteria for India)

S.No.	Categories of Hyperglycemia	Glucose Concentrations mmol/l (mg/dl) Plasma
1.	Diabetes Mellitus	
	Fasting	≥ 7.0 (≥ 126)
	2-hour post glucose load	(75g) ≥ 11.1 (≥ 200)
2.	Impaired Glucose Tolerance (IGT)	
	Fasting	< 7.0 (< 126)
	2-hour post glucose load	(75g) ≥ 7.8 (≥ 140) and < 11.1 (< 200)
3.	Impaired Fasting Glycemia (IFG)	
	Fasting	≥ 6.1 (≥ 110) and < 7.0 (< 126)
	2-hour post glucose load	(75g) < 7.8 (< 140)

Management

Oral Anti-Hyperglycemic Agents

When non-pharmacological treatments are unable to achieve or maintain adequate glycemic control, oral antidiabetic drugs are indicated.^[19, 20]

Sulphonylureas

Sulphonylureas have been the mainstay of oral treatment for Type 2 DM for the past 40 years., A succession of more potent 'second-generation sulphonylureas (glibenclamide, gliclazide and glipizide) emerged in the 1970s and 1980s. The latest, glimepiride, was introduced in the mid-1990s.

Biguanides

Metformin and Phenformin were reported in 1957. Phenformin was withdrawn in many countries in the 1970s due to a high incidence of lactic acidosis. Metformin is currently the most extensively used oral agent for Type 2 DM worldwide

Thiazolidinediones

Rosiglitazone and Pioglitazone were introduced in Japan and the US in 1999 and in Europe in 2000.^[25]

α-Glucosidase Inhibitors

The first α-Glucosidase Inhibitor, acarbose was introduced in the early 1990s. Recently two further α-Glucosidase Inhibitors, miglitol and voglibose have been introduced in some countries [26].

Meglitinide Analogues

The non-sulphonylurea portion of glibenclamide – a benzamido compound termed meglitinide – was shown to stimulate insulin secretion in the early 1980s. Repaglinide was introduced in 1998 [27].

PRESCRIBING PATTERN:

I. Type of study

A prospective cross-sectional study was conducted in the outpatient Department of Medicine in “TEERTHANKER MAHAVEER HOSPITAL”, Moradabad, U.P. Proper informed consent was obtained from all patients. There was no monetary benefit given to the patients.

II. Duration of study

The study was conducted for one year from January 2011 to December 2011.

III. Criteria for Selection

• Inclusion Criteria:

1. Only newly diagnosed patients of Type 2 diabetes.
2. Patients of age group 30 to 80 yrs.

• Exclusion Criteria:

1. Patients below 30 years of age.
2. Patients above 80 years of age.
3. Pregnant patients.
4. Patients with severe uncontrolled diabetes.
5. Patients with mental incompetence.

IV. Method of collection of data

Patients with established type 2 diabetes (n = 206) visiting the Out Patient Department were interviewed and the following data obtained was tabulated in Microsoft Excel:

From this data, following results were calculated:

- Age, weight and sex Distribution of the Diabetic Patients.
- Education and income of the Diabetic Patients.

- Duration of Diabetes.
- Prevalence of Associated Diseases and Disorders.
- Prevalence of Diabetic Complications.
- Pattern of Antidiabetic drugs prescribed.

In the prospective study 206 patients visited the outpatient medicine department of Teerthankar Mahaveer Medical College and Research Centre, Moradabad. Out of these 206 patients, 116 were male patients and 90 were female patients.

The maximum numbers of male patients suffering from Type 2 DM were from the age group of 30-50 years while that of female patients were from the age group of 60-75 years.

Maximum number of patients including both males and females (n= 59) had their weight in the group of 51-60 kgs.

The duration of diabetes with maximum number of patients (n=84, P= 40.7%) was from 1-5 years.

The prevalence of diabetic complications was found in 18.4% patients (n= 38) with

diabetic retinopathy and 21.3% patients (n= 44) with diabetic neuropathy.

Sulphonylureas were the most prescribed oral hypoglycaemic agents with (n=104, P= 50.4) followed by biguanides (n= 96, P= 46.6%). α - glucosidase inhibitors were the least prescribed class (n= 2, P= 1.1) while meglitinides were not at all prescribed.

The combination of Sulphonylureas and Biguanides was the most prescribed combination (n= 56, P= 33.7%) while the combination of Sulphonylureas and Thiazolidinediones was the least prescribed (n= 2, P= 1.4%) .

Table- 1 represents the prevalence of co-morbidities with 41.7% of diabetic patients suffering from hypertension (n= 86) as the co-morbidity.

Table- 2 shows that cardiovascular drugs were the second most prescribed class (n= 102, P= 49.5) after the oral hypoglycaemic agents with vitamins at the third place (n= 96, P= 46.6%). From past few years, there has been a growing concern in India for promotion of safe, effective and rationale use of drugs. This is to improve the quality use of drugs and also to prevent drug induced diseases. Drug utilization studies

can contribute to national health policies designed to promote the availability of safe and effective medicines and also for reducing the cost of medication. The primary purpose of drug utilization review is to enhance the quality of drug therapy. Due to limited resources, identifying effective pharmacological treatment among diabetic patients is of increasing importance. Drug utilization research is useful for evaluating physician prescribing patterns (e.g. the choice of individual drug amongst the sulphonylureas). Data from these studies can be linked to the measures of morbidity, in order to explore the efficacy and toxicity of different therapies. Drug utilization studies of agents other than those used to treat diabetes can estimate concomitant medical conditions. Prescription survey is an important Pharmaco-epidemiological method that provides a relatively unbiased picture of prescribing habits and evolves comprehensive drug policy for better health care delivery.

Result:

Among all the drugs prescribed to Type 2 DM patients, 43.4% were found to be anti-diabetic drugs. The most prescribed drugs

were sulphonylureas (50.4%). Biguanides were the second most prescribed drugs (46.6%). In our study, maximum patients were prescribed combination therapy of two or more oral anti diabetic drugs (44.7%). A similar study done in a teaching hospital in India, 2010, found that majority of Type 2 Diabetes patients were treated with multiple oral antidiabetic drug therapy. The most commonly prescribed antidiabetic drug was metformin followed by glimepiride, pioglitazone and miglitol^[51, 52]. According to study done in 2011, metformin was the only drug with which less than 10% of the patients have some contraindications^[53]. Our study, in accordance with the study conducted by Kabadi UM, 2004, found that among the sulphonylureas, glimepiride was the most prescribed drug, followed by gliclazide and glipizide^[54].

It was observed in a teaching hospital that, glimepiride was the most prescribed sulphonylurea that promotes an efficient glycemic control^[55]. According to Issa M et al, (2006) Glimepiride in comparison with pioglitazone is associated with faster glycemic control, lower total and LDL cholesterol levels and reduced short-term healthcare costs^[56]. In our study, the most

prescribed combination of oral anti hyperglycemics was glimepiride and metformin (33.7%). Combination of metformin and sulphonylureas is preferred as it represents the most cost-effective second-line therapy and an improvement in coronary endothelial function [57]. In a similar study, combination of metformin with a sulphonylurea, acarbose or a thiazolidinedione produced an additive blood glucose-lowering effect. Metformin and sulphonylureas have same glycemic control and lipid profile but metformin has an improved BMI when compared to them [58].

Thiazolidinedione usages alone or in combination were lower due to the high cost of medication. Currently only Pioglitazone is available for use as a single agent or in combination with metformin or sulphonylureas. Meglitinides are not prescribed to the patients because of its short onset of action.

The maximum prescribed class of drugs other than oral antidiabetic drugs is anti-hypertensives (49.5%). Vitamins (46.6 %) are the second class of drugs prescribed after anti- hypertensives. Biguanides were

known to cause malabsorption and increased faecal loss of vitamin B₁₂. Hence, it is essential to supplement patients on biguanides with vitamin B₁₂ otherwise they may manifest with its deficiency.

The study revealed that more males were affected by diabetes type 2 as compared with females in the age group less than 60 years while the diabetic females were more after the age of 60 years. This may be due to genetic factors, hypertension, high calorie food, sedentary lifestyle, alcohol consumption, smoking and some other environmental factors which are more prevalent in young males compared with females [59]. Obesity may be the major cause of female diabetic prevalence in the ages above 60.

*The procedure which is not been followed in the medicine department of Teerthankar Mahaveer Hospital were:

- The use of SMBG for optimal glycemic control.

The above limitation was only because of the low socio-economic group of the patients. The high cost of these biochemical

tests was the reason for not being followed as per the AACE guidelines, 2002.

The research on drug utilization in Type 2 DM found the following results:

- The approach of treatment is initiation of therapy with lifestyle modification followed by oral anti-diabetics.
- Most of the cases had complicated diabetes requiring oral anti-diabetic drugs for control of diabetes.
- Oral anti-diabetic drugs including sulphonylureas, biguanides and their combinations are among the most commonly prescribed drugs for Type 2 DM.
- Usage of glimepiride has increased compared to the usage of gliclazide, which may be due to less secondary failure rates for glimepiride than gliclazide.
- The two most common diabetic complications observed were diabetic retinopathy and diabetic peripheral neuropathy.
- Hypertension was found to be the most common associated disease with Type 2

Diabetes and has been increasing in diabetics significantly. The other co-morbidities are CAD and dyslipidemia.

- Though SMBG is an important part of diabetes management programme, it is not a usual practice among the diabetic patients in the clinic, due to high cost of glucometer and test strips. It is suggested that SMBG should be promoted in Indian diabetic patients for better glycemic control.
- Following the prescribed diet and exercise programme strictly is necessary along with the anti-diabetic drugs, for better control of diabetes.
- Achieving better glycemic control is a therapeutic goal for Type 2 DM patients, which can decrease the prevalence of the devastating complication and thereby improves quality of life and reduces the burden of diabetes.
- As the prevalence of diabetes is increasing in India, intensive diabetes self management programs by imparting properly structured knowledge by pharmacist should be made mandatory in all hospitals,

dispensaries and primary health centres to avoid the complications of diabetes as well as burden of the disease.

Conclusion

A firm conclusion of this study strongly highlights the need for patient education or

counselling on use of antidiabetic and concomitant drugs, monitoring of blood glucose and glycosylated haemoglobin (HbA1c) levels, dietary modification with low calorie food, and correction of diabetic complications.

TABLE 1: PREVALENCE OF CO-MORBIDITIES

	Number	Percent
Hypertension	86	41.7
Hypertension with CAD	6	2.9
Hypertension with Dyslipidemia	8	3.8
Hypertension with other diseases	8	3.8
Dyslipidaemia	0	0
Miscellaneous	38	18.4
No disease	60	29.1

TABLE 2: USAGE OF OTHER DRUGS

	Class of drugs	Number	Percent
1	Cardiovascular drugs	102	49.5
2	Hypolipidaemic agents	20	9.7
3	Antidepressants	10	4.9
4	Vitamins	96	46.6

FIGURE 1: USAGE OF DRUGS IN TYPE 2 DM

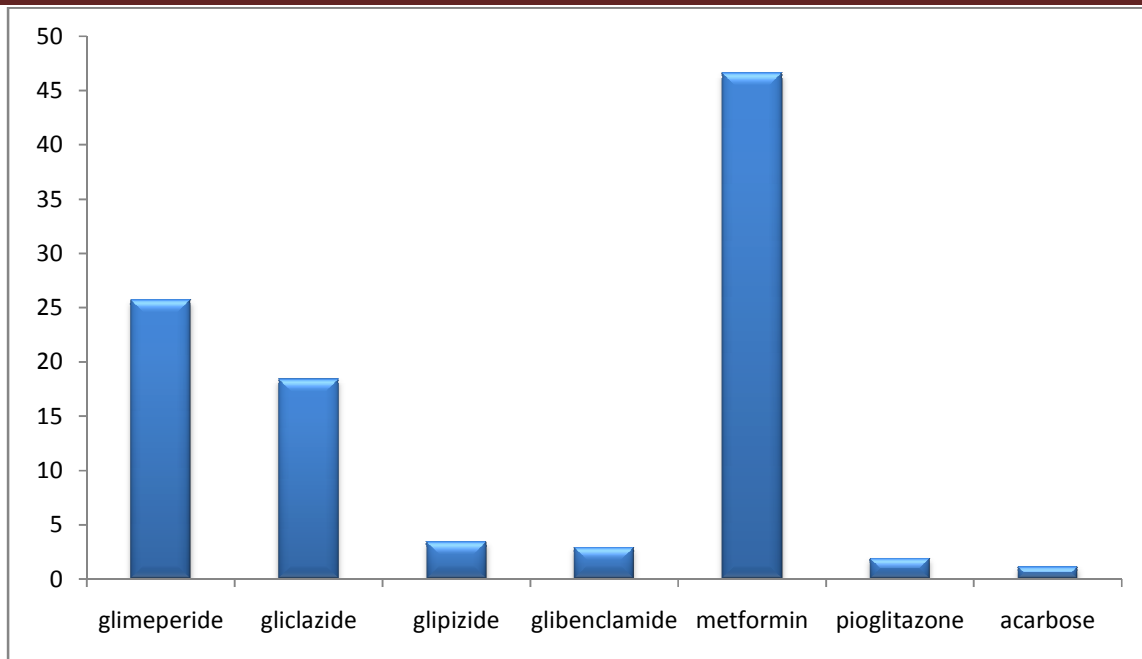
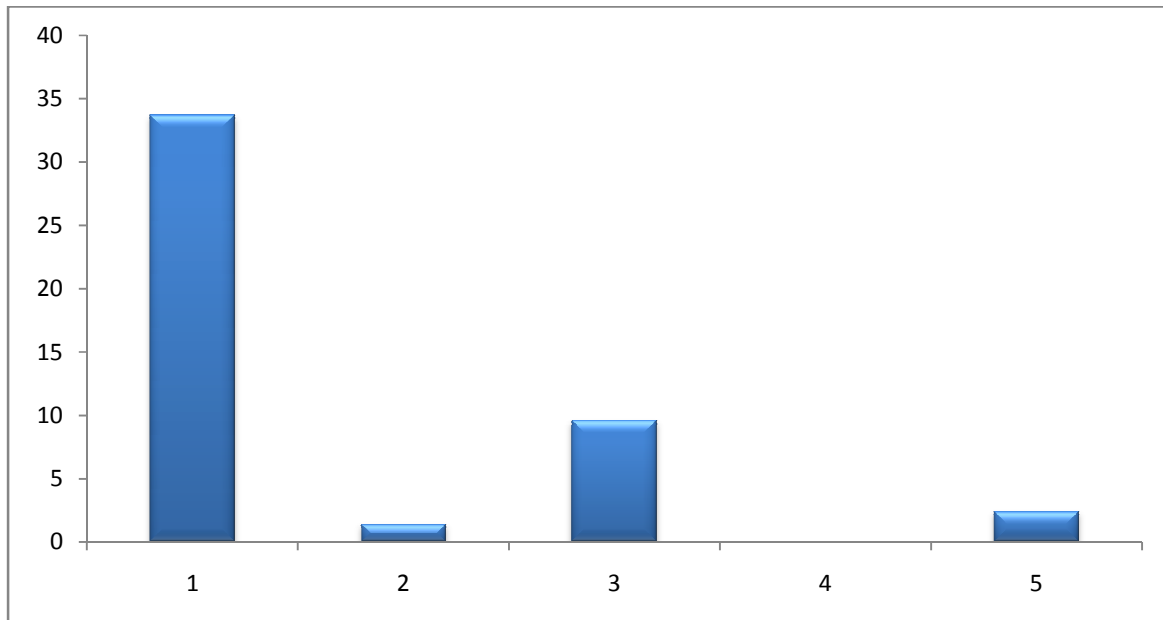


FIGURE 2: USAGE OF DIFFERENT ANTIDIABETIC COMBINATIONS



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