



DRUG UTILIZATION PATTERN OF ANTI-DIABETIC DRUGS AMONG DIABETIC OUTPATIENTS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Drug utilization studies provide useful insights into the current prescribing practices and also identify irrational prescribing. In this prospective observational study, 150 prescriptions of Diabetes mellitus (DM) patients were collected in MGM Medical College and hospital. Adult diabetic patients (either newly diagnosed or known cases) of either sex, who were prescribed at least one anti-diabetic medication (OHA/Insulin) were included in the study. Patients with any malignancy; pregnant and lactating females were excluded. A total of 200 out of 150 were included, (64%) male and (36%) female patients were identified. The Majority of patients were in the age group of > 71 years (46%) and most of the patients had a Type 2 DM. Most of patient were on triple therapy followed by dual and mono therapy. Metformin was the most commonly prescribed drug in monotherapy and glimepiride + metformin was the most common two drug therapies. Average cost of drug therapy was Rs. 200 per patient per month for mono therapy followed by Rs. 400 and 700 per patient per month for dual and triple therapy respectively. Co-morbid condition was found in 52 patients out of 150, CVD being the most common co-morbid condition. 17 ADRs were observed with hypoglycaemia being the most common ADR reported. Optimal medication adherence is the ultimate goal to control the hyperglycaemia in DM.

Keywords: Diabetes Mellitus, Anti- hyperglycaemic drugs, Physician prescribing pattern.

INTRODUCTION

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 [1]. Several drug utilization studies on anti-diabetic agents are available across the world, including India. Drug utilization research can increase our understanding of how drugs are being used. It can be used to estimate the numbers of patients exposed to specified drugs within a given time period. It can describe the extent of use at a certain moment and/or in a certain area (e.g. in a country, region, community or hospital) [2].

Researchers can estimate to what extent drugs are properly used, overused or underused. It can determine the pattern or profile of drug use and the extent to which alternative drugs are being used to treat particular conditions. It can be used to compare the observed patterns

of drug use for the treatment of a certain disease with current recommendations or guidelines. It can be used in the application of quality indicators to patterns of drug utilization [3]. To obtain a rough estimation of quality of prescribing, Drug utilization data can be feedback to prescribers. This is particularly useful when the drug prescribing by a particular individual can be compared with some form of gold standard or best practice, and with the average prescriptions in the relevant country, region or area [4].

According to WHO, Diabetes mellitus is defined as a metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, protein and fat metabolism resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycaemia of diabetes is associated with long-term damage, dysfunction and failure of various organs,

especially the eyes, kidneys, nerves, heart and blood vessels [5].

India has the dubious distinction of being home to a large number of people suffering from diabetes. India has the largest population of diabetes in the world. The international diabetes federation (IDF) estimates the number of people with diabetes in India will reach 80million by the year 2025 [6]. A survey depicts that 4% of adults in India suffered from diabetes in the year 2000 and is expected to increase to 6% by the year 2025 [7]. The world health organization (WHO) has projected that the global prevalence of type-2 diabetes mellitus will more than double from 5 million in 1995 to 300 million by 2025. Between 1995 and 2025, there will be a 35% increase in worldwide prevalence of diabetes mellitus, from 4 to 5.4% [8]. A projected to rise from 171 million in 2000 to 366 million in 2030 is noted worldwide. The urban population in developing countries is projected to double between 2000 and 2030 [9].

Modern principles of management of diabetes focus on disease prevention, screening high risk individuals and aggressive treatment of individuals in the pre-diabetic state. The current pharmacotherapy of diabetes mellitus includes treatment with drugs such as insulin and oral hypoglycaemic agents [10]. Oral hypoglycaemic agents are heterogeneous in their modes of action, safety profiles and tolerability. The main classes include agents that stimulate insulin secretion (sulfonylureas and rapid acting secretagogues), reduce hepatic glucose production (biguanides), delay digestion and absorption of intestinal carbohydrate (α -glucosidase inhibitors), improve insulin action (thiazolidinedione) and incretin based therapies like dipeptidyl peptidase-4 inhibitors [11].

The choice of agents largely depends upon:

- HbA1c reduction required and the ability of the drug to provide the reduction
- Ability to address the components (fasting and post prandial) of glycemia
- Ability to minimize hypoglycaemia and weight gain
- Safety in a variety of clinical situations including cardiovascular safety
- Adverse events associated with the drug
- Cost effectiveness of the therapy

In addition, drug utilization studies provide useful insights into the current prescribing practices and also identify irrational prescribing. The consequences of irrational prescribing include non-adherence to medications, which can result in complications due to uncontrolled blood glucose levels and also escalate drug costs and health care costs [12]. In view of this, the present study was designed to evaluate the prescribing pattern of anti-diabetic drugs among diabetic outpatients in a tertiary care teaching hospital.

Moreover, there are no accepted guidelines for treating type 2 diabetes mellitus in Indian scenario, because

all are formulated in western countries. Moreover, it is necessary to follow a treatment protocol in common co-morbidities associated with type 2 diabetes. Since the literature review on drug utilization pattern in urban parts of India yielded a very few data, we planned to carry out a study to evaluate the drug utilization pattern among diabetic patients in an urban population of Maratwada, Maharashtra.

The principal aim of drug utilization studies (DUS) is to facilitate the rational use of drugs in population. DUS is an essential part of pharma coepidemiology as it describes the extent, nature and determinants of drug exposure and it is used to identify treatment adherence problems.

Hence this study was held with following objectives

- 1.To determine demographic details such as age, gender etc of diabetic patients under the study.
2. To study the Drug utilization pattern.
3. To analyse effectiveness of different existing drug therapies.

MATERIAL AND METHODS

Experimental Design and Data collection procedure

This prospective observational study was conducted over a period of 6 months in the outpatient departments of General Medicine and Endocrinology at MGM Medical College and hospital, a tertiary care, teaching and super-specialty refer Trral hospital. The study was approved by the Institutional Ethics Committee. A total of 200 prescription of patients were screened, out of which 150 being a known case of DM under treatment of both genders and aged between 18 to 80 years were included in the study.

Adult diabetic patients (either newly diagnosed or known cases) of either sex, who were prescribed at least one anti-diabetic medication (OHA/Insulin) were included in the study. Patients with any malignancy; pregnant and lactating females were excluded. Patient data relevant to the study were obtained by exam Bacjination of patient's medical records, direct interview of the patient or his/her caregivers and the hospital information system. The data were recorded in a standard data collection form. Details about demography, medical history, diagnosis data, duration of diabetes, family history of diabetes, co-morbid conditions, laboratory investigations, and anti- diabetic drug utilization, were collected.

Each prescription contained the drug, quantity, duration and date of dispensing. Each anti-diabetic medication was classified into one of the following classes: Metformin, Dipeptidyl peptidase-4 (DPP-4) Inhibitors, Glucagon-like peptide (GLP-1) receptor antagonists, Sodium-glucose co-transporter 2 (SGLT-2) inhibitors, Alpha-glucosidase inhibitors (AGIs), Thiazolidinedione (TZD), Sulfonylureas (SUs) and Insulin.

The adverse drug reactions (ADRs) related to anti-diabetic drugs were monitored and documented in suitably designed ADR monitoring forms. The severity and

causality of the ADR were 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.

Statistical analysis

The data were analysed using graph pad prism version 6.0. Level of significance (p value) was set at 0.05. Patient's demographic data were presented as mean± standard deviation (SD).

RESULT

Out of the 150 patients enrolled in the study, 96 (64%) were males and 54 (36%) were females in figure 1.

Among the study population in figure 2, the greatest number of patients were in the age group more than 71 years, followed by 31-70 and least is less than 30 years.

In figure 3 Total 16% patients were Type 1 DM and remaining 84% were type 2 DM.

Adherence to guidelines

In figure 4 shows the mono and combination therapies followed for the treatment of DM. The present study revealed that most of the physicians prescribed mono therapy (40%) to control hyperglycaemic followed by dual therapy (35%) and triple therapy (25%).

Among 150 patients, 126 were T2DM patients who are on oral antidiabetic drugs prescribed, 49 patients (38.8%) were prescribed with Biguanide, 27 patients (21.4%) with Sulfonylureas, 21 patients (16.6%) with Thiazolidinedione, 11 patients (8.7%) with Dipeptidyl peptidase-4, and remaining 18 patients (14.2%) with Miscellaneous as shown in figure 5. Whereas, Metformin is the most prescribed drug followed by DPP-4I in monotherapy. Metformin+ Sulfonylureas (SU) and Metformin +SUs+ Thiazolidinedione (TZD) combination is most predominantly used in dual therapy and triple therapy respectively.

Drug consumption and cost analysis

Drug consumption was calculated in DDD/1000 patients/day. The average cost of treatment was less than Rs.200/patient/ months followed by 71 patients were Rs. 201-500/ patient/ months and remaining 29 patients were more than Rs. 501/patient/ months as depicts in figure 6.

In figure 7, Co-morbid conditions were found in 150 patients. Among the 150 patients, majority 52 patients had more than two comorbid conditions in our study, followed by 37 patients with one co morbid condition remaining 61 patients were without any comorbidity. These results are represented in Figure 5. The comorbid conditions found were 41 % cardiovascular disease (hypertension, coronary artery disease), 9% Infective/immune disease, 12% neuropathy, 3% GIT infection, 27% Endocrine/Metabolic disease, 3% Musculoskeletal disease, 2% skin disease, 3% RTI. These

results are depicted in Figure 8.

Among 150 patients, 113 patients were reported ADRs during the study (Table 4). 58% patients were Hypoglycaemia was the most common ADR observed, Gastric irritation were 16%, 23% observed nausea and remaining 3% were abdominal discomfort.

DISCUSSION

Diabetes mellitus is a metabolic disorder as stated by WHO which requires the chronic treatment [13]. Besides the life-style modifications and dietary changes, the pharmacological treatment an integral component in the management of diabetes [14]. A drug utilization study is considered to be one the most effective methods to assess and evaluate the prescribing attitude of physician and help to promote rational use of drugs.

In our study, the prevalence of diabetes mellitus is more in male (64%) than females (36%). The older-aged group people (>71years) are more prevalence to the diabetes mellitus followed by 31-70 years and least were less than 30 years, which is same results were obtained in study the of drug utilization pattern and effectiveness analysis in diabetes mellitus conducted by Premalatha Das [15].

In the present study, 84% patients had Type 2 diabetes mellitus, whereas 16% patients suffered from Type 1 diabetes mellitus. As diabetes progresses, functional decline in beta cells is usually apparent, and the need for combination therapy is unavoidable. Therefore, combination modalities have become an integral part of diabetes management. The basic rationale for combination therapy is to provide additive effects with different mechanisms of action and to allow lower doses for disease management. Consistent with the same, in the present study, majority (40%) of the patients were on triple therapy followed by dual and mono therapy. In a study conducted in rural areas of Tamil Nadu, monotherapy, and two drug combination therapies were prescribed in 21.7% and 78.3% patients, respectively [16].

This study determines that DDD/1000 inhabitants/day for Metformin was more which is more utilized anti diabetic drug than others and Glimepiride was more utilized drug in Sulfonylureas. Similar results were obtained in a study conducted by Adibe M.O on Outpatient Utilization of Anti-Diabetic Drugs [17]. Metformin alone and Metformin combination (anti-diabetic drugs) was commonly prescribed anti-diabetic drug observed in the present study, similar to the results obtained in the study conducted by Bela Patel on pattern of anti- diabetic drugs in type-2 diabetic patients [18].

Cost of prescription is very important in chronic disease like diabetes as it may be a major cause for non-adherence to treatment. In our study, the most of the patients were average cost for both insulin and oral antidiabetic agent was under 200-500 INR/patient/month, which was lower in comparison to study conducted by

Acharya et al, where average cost was between 100-400 INR/patient/month [19].

Majority of the patients were suffering from co-morbid conditions. It was observed that comorbidities are more in diabetic patients among them were 41 % cardiovascular disease (hypertension, coronary artery disease), 9% Infective/immune disease, 12% neuropathy, 3% GIT infection, 27% Endocrine/Metabolic disease, 3% Musculoskeletal disease, 2% skin disease, 3% RTI are commonly reported in the current study area setting, which is similar to a study conducted by Dr. P.Sharma on screening of prescriptions in patients of type 2 diabetes mellitus [20].

Limitation

First, it was short duration study including only

150 patients. Secondly, the patient population had relatively shorter history of DM and Glycated haemoglobin is more reliable to assess glycaemic control over a period of 3 months. But this was not used in this study because of less time period for our follow up and all patients included for effectiveness were diagnosed cases. Thirdly, we did the study only at OPD. If we would have performed that in pharmacy, it would incorporate more information, especially the WHO facility indicators. Lastly, the effectiveness of different OHA were not able to compare with each other effectively because of the different sample size for each type of drug treatment and patients who are included in our study might be followed life style modifications, dietary changes, physical exercise, that may affect the precise evaluation of effectiveness of OHA.

Fig 1. Distribution of the Diabetic Patients according to sex

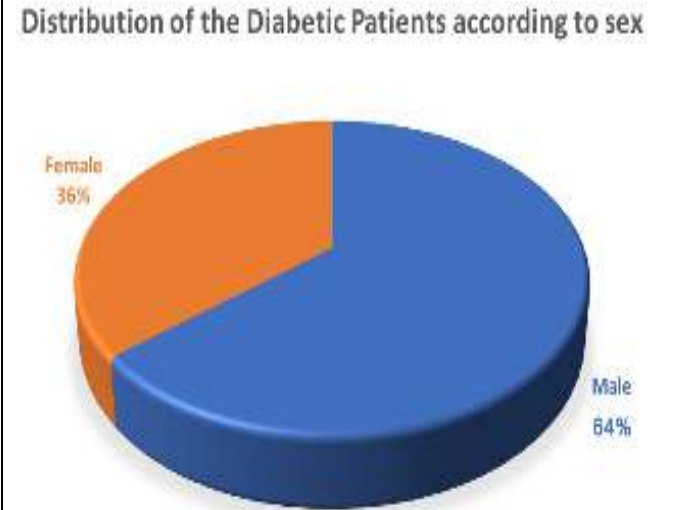
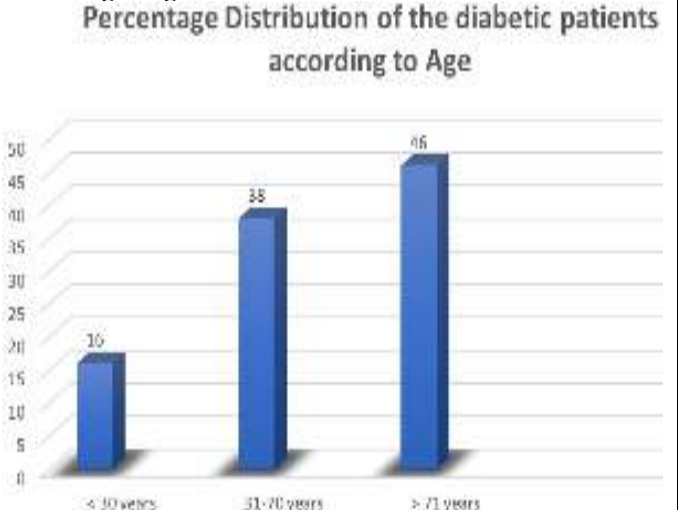


Fig 2. Percentage Distribution of the Diabetic Patients according to age



Distribution of diabetic patients according to Types of Diabetes

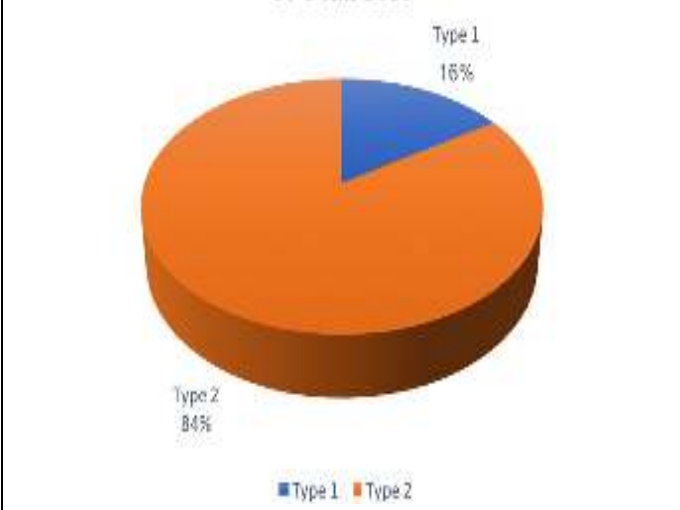


Fig 4. Percentage of Anti-diabetic drug Therapy pattern among study population

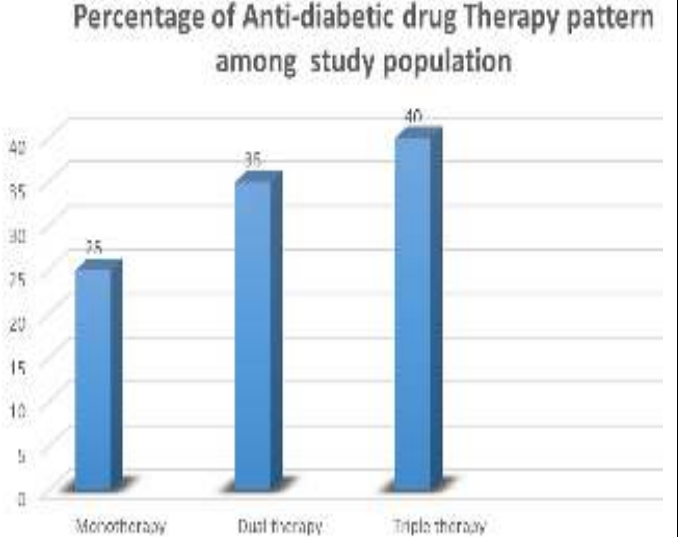
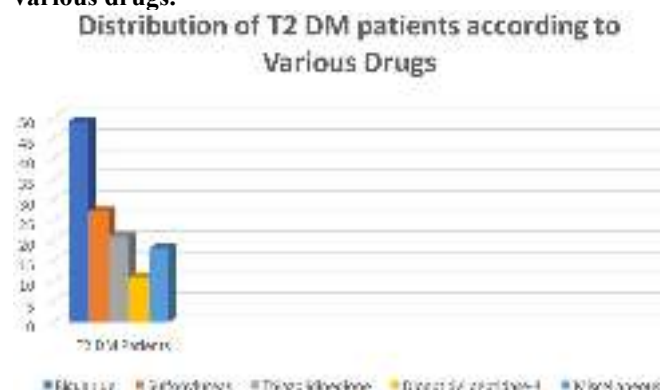
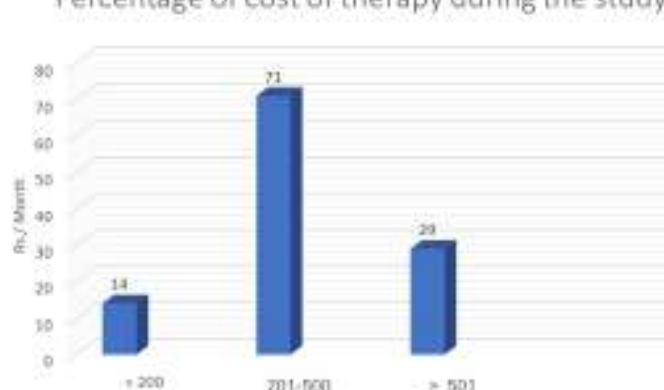
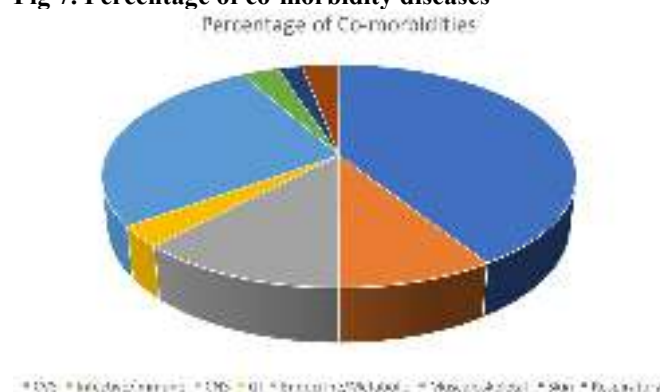
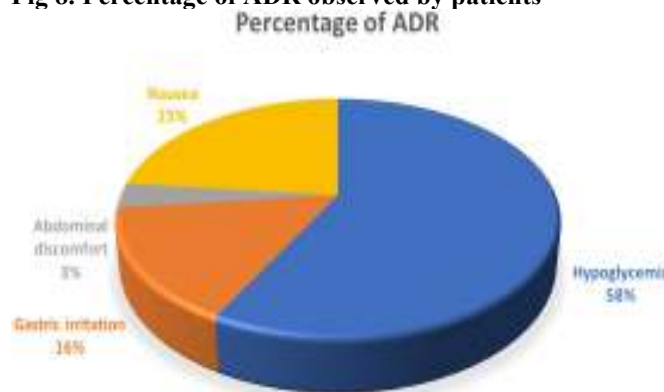


Fig 5. Distribution of T 2DM patients according to various drugs.**Fig 6. Percentage of cost of therapy during study****Fig 7. Percentage of co-morbidity diseases****Fig 8. Percentage of ADR observed by patients**

CONCLUSION

However, Drug utilization studies are an important mirror of pattern of use of drugs in community in actual practice, reflecting not only preference of doctors in drug selection and their prescription, but also cost of therapy, convenient regimen and their impact on medical, social and economic factors. It is a dynamic process, hence is to be undertaken time by time on different places, on different patient population with different socio-economic background.

Among all patient's male are more in number when compared to females. The old-aged group people are more prone to the diabetes mellitus. It was recognized that patients with diabetes are generally prescribed for a long period than other patients. It is noteworthy that Metformin was most commonly utilized anti diabetic drug than others and Glimepiride was most utilized drug in Sulfonylureas. Metformin alone and Metformin combinations (with other

anti-diabetic drugs) were commonly prescribed to diabetic patients in current scenario. Combination therapy is preferred more in the current setting in order to control the FBS of the patients, in which 2-drug combination is more in use, in 3-drug combination Metformin+ Glimepiride+ Pioglitazone was the most commonly prescribed than other combinations. Combinations of Metformin +Sulfonylureas + Others showed a good control of fasting blood sugar when compared with only Metformin, only Sulfonylureas or Metformin +Sulfonylureas, Sulfonylureas + Others.

Therefore, through a thorough understanding of the existing prescribing patterns, attempts can be made to improve the quality and efficacy of drug therapy. Besides setting standards and assessing the quality of care. We planned to extend the study to incorporate more patients in future and also to monitor their compliance to drugs for longer duration.

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