Research Article

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Drug Utilization Evaluation Of Oral Hypoglycemic Agents In Tertiary Care Teaching Hospital.

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ABSTRACT

Background: The present study evaluates the anti-diabetics and glycemic control of Diabetic patients attending in the Department of General Medicine, it is a Prospective and observational study carried out in Adichunchanagiri Hospital, B G Nagara. A group of metabolic diseases collectively referred to as diabetes mellitus (DM) are characterized by high blood sugar levels brought on by insufficiencies in insulin secretion, action, or both. Diabetes mellitus (DM) is becoming an important public health problem in developing countries, especially in India. Diabetes is currently treated using a variety of anti-diabetic medication classes, such as insulin and oral hypoglycemic agents (OHAs), which work through a variety of mechanisms to lower blood glucose levels in order to maintain ideal glycemic control, because it provides the foundation for enacting modifications to prescription dispensing regulations at the local and national levels, the use research of these drugs is significant in clinical practice.

Objective: The study aims to assess the drug utilization pattern of Anti-diabetics in Diabetes Patients, and patient glycemic status, To Identify Diabetic Complication.

Materials And Methods: A suitable data collection form will be designed to collect the necessary and relevant information. The demographic details of the patient such as name, age, sex, and clinical data such as diagnosis, and clinical condition, therapeutic data such as the name of the antidiabetics, dose, route, frequency, duration of therapy, and other relevant data will be collected by reviewing the case note, treatment chart, and lab data report. All patients will be monitored from the day of admission till the day of discharge. During the treatment, the enrolled patient will be evaluated clinically every day to assess the clinical outcome.

Results: The study included 98 participants, with most aged 51-60 years (36.7%) and more males (60.2%). Patients had varied blood sugar levels, with 39.8% having RBS >250 mg/dL, and 87.8% showing FBS >126 mg/dL. Metformin was the most common treatment (36.7%), and dual therapy was prevalent (41.8%). Retinopathy (7.1%) was the most frequent diabetic complication.

Conclusion: The study shows that 83.70% of diabetic patients had HbA1c levels above 6.5% indicating poor glycemic control in these patients. With 41.80% undergoing dual therapy, metformin is widely used. Nephropathy, retinopathy, and ketoacidosis are among the persistent complications that highlight the need for improved treatment approaches, patient counselling, and regular monitoring.

Keywords: Diabetes Mellitus, Drug utilization and evaluation, Oral hypoglycemic agent, Drug Utilization Research (DUR), Drug Utilization Evaluation (DUE)..

INTRODUCTION

Diabetes mellitus (DM) is a progressive metabolic disease-causing hyperglycemia due to decreased insulin production or action. It can lead to neuropathic illness, macrovascular issues, and complications. India has the highest diabetes prevalence globally, with over 57.2 million by 2025.treatments include insulin and oral hypoglycemic drugs (1). Type 2 diabetes accounts for about 90% of instances of diabetes mellitus, which was first recorded as long as 3,000 years ago. Medication, food, and lifestyle adjustments are all part of effective management. if oral medication doesn't work, insulin therapy is needed. for the best glycemic control and to minimize complications, treatment adherence is essential (2). Diabetes, a growing global health concern, affects 592 million

people globally, with type 2 accounting for over 85% of cases. its major side effects include heart attack, stroke, peripheral vascular disease, and microvascular conditions. Diabetes also has significant financial, life expectancy, and early disease and death impacts (3). Type 2 diabetes, prevalent in the elderly, is treated using various anti-diabetic drugs, including insulin and oral hypoglycemic agents (OHAs), to achieve optional aid in the production of insulin, reducing blood sugar levels (4,5). The most widely used oral antidiabetic drugs (OADs) for treating diabetes are biguanides and sulfonylureas. Glinosides, alpha-glucosidase inhibitors, and thiazolidinediones are examples of other OADs. these drugs increase sensitivity, decrease absorption of glucose, increase excretion of glucose, and stimulate insulin production. Through AMPK activation, metformin reduces hepatic glucose production and increase insulin sensitivity. The absorption of glucose and insulin sentivity are enhanced by thiazolidinediones. Alpha-glucosidase inhibitors induce satiety and decrease the absorption of glucose. Circoset regulation in the hypothalamus is aided by it (6,7). Research indicates that variations in blood pressure, plasma lipids, heart rate, body weight, and serum uric acid, as well as variations in glucose levels, may be responsible for issues associated with diabetes. These variabilities combined impacts make it unclear if they are causative or just symptomatic of underlying problems. Studies show that this variability may be influenced by target level achievement and the quality of healthcare. More focused research is required, even though some causality seems possible. over time, monitoring these variables could improve risk factor management and healthcare quality (8).

As diabetes becomes more common place worldwide, action must be taken to lessen its burden and complications, which will ultimately increase mortality and decrease quality of life. Combination therapy is a potentially effective therapeutic strategy that helps manage weight, improves glucose control, lessens complications in both type 1 and type 2 diabetes (9,10). The condition is frequently linked to musculoskeletal disorders, which are long-term issues with unknown causes. For diabetes patients to improve their quality of life and physical function, early detection and treatment are essential (11). Drug Utilization Research (DUR) is a WHO-defined study on drug marketing, distribution, prescription, and use, aiming to promote rational medication use (4). The Drug Utilization Evaluation (DUE) program is essential in assisting manage healthcare systems in comprehending, interpreting, and assessing and enhance the administration, prescription, and use of pharmaceuticals (12). Drug Utilization Evaluation (DUE) is a methodical procedure that examines the prescription practices of medical professionals, the activities of pharmacists, and the medication use by patients. It guarantees wise choices and positives patient outcomes. Standardized indicators are created by international organizations such as INRUD and the World Health Organization (WHO) to enhance drug use in poor. Although drug therapy is essential in primary care, its usage can result in abuse, excessive expenditures, and difficulties. To recognize improper drug usage and encourage reasoned therapy, DUE is advised. The Drug Utilization Evaluation (DUE) program promotes the effective use of scare healthcare resources, especially among pharmacists, by assisting in the knowledge, analysis and improvement of drug prescribing, administration, and use (7,13).

MATERIALS AND METHODS

A Prospective and Observation study of 4 to 6 months period was conducted among 98 diabetes type 2 patients attending the department of General Medicine in tertiary care teaching hospital. Based on the inclusion and exclusion criteria patients were enrolled in the study by using a suitable data collection form which contains the necessary and relevant information such as demographic details of the patient such as name, age, sex, and clinical data such as diagnosis, and clinical condition, therapeutic data such as the name of the antidiabetic, dose, route, frequency, duration of therapy, and other relevant data will be collected by reviewing the case note, treatment chart, and lab data report. The statistical package for social sciences version 25 (SPSS) was used for data analysis. Descriptive statistics have been used to summarize quantitative data by reporting means, frequency, and percentages.

RESULTS

A comprehensive characterization across multiple parameters associated with diabetes and its management is provided by a study involving 98 participants. According to the age distribution, the majority of patients are between the ages of 51 and 60 (36.7%) and 41 and 50 (31.6%), with only 1% falling into the 20 to 30 age range. 39.8% of the participants are female, while 60.2% of the participants are male.

According to random blood sugar findings, 35.7% of patients had blood sugar levels below 200 mg/dL and 39.8% of patients had levels above 250 mg/dL. Only 4.1% of patients had blood sugar levels below 100 mg/dL, while 87.8% of patients had levels above 126 mg/dL based on fasting blood sugar levels. 67.3% of people had postprandial blood sugar levels higher than 200 mg/dL. According to glycated haemoglobin (HbA1c) readings, 83.7% of patients had levels higher than 6.5%, meaning that most of them had poorly managed diabetes.

The most popular medication is metformin alone, which is taken by 36.7% of patients. Glimepiride and metformin together account for 23.5% of patient treatments. For 41.8% of patients, dual therapy is the recommended course of treatment, followed by monotherapy for 39.7% and triple therapy for 18.3%.

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Retinopathy (7.1%), nephropathy (4.1%), and diabetic ketoacidosis (3.1%) are among the problems the problems that are common in this population with diabetes.

Table 1: Age distribution and gender distribution of patients.

Age Group (Years)	Number of Patients	Percentage (%)	Gender Distribution (Males %)	Gender Distribution (Females %)
20-30	1	1	60.2	39.8
31-40	7	7.1	60.2	39.8
41-50	31	31.6	60.2	39.8
51-60	36	36.7	60.2	39.8
61-70	23	23.5	60.2	39.8

Table-2: This Table Shows Fasting Blood Sugar, Post Prandial Blood Sugar and Glycated Haemoglobin Levels.

Measurement	Category	Number of Patients	Percentage (%)
FBS Level (mg/dL)	<100	4	4.1
	100-125	8	8.2
	>126	86	87.8
PPBS Level (mg/dL)	<140	2	2
	140-199	30	30.6
	>200	66	67.3
HbA1c Level (%)	<5.7	2	2
	5.7-6.4	14	14.3
	>6.5	82	83.7

Table 3: Details of oral antidiabetic drugs prescribed among the study population and Therapy Regimens.

Characteristics	Category	Frequency	Percentage (%)
Treatment	Dapagliflozin + Metformin + Voglibose	1	1
	Dapagliflozin + Metformin + Vildagliptin	1	1
	Glimepiride + Metformin + Voglibose	10	10.2
	Glimepiride + Metformin + Pioglitazone	6	6.1
	Dapagliflozin + Sitagliptin	2	2
	Vildagliptin + Metformin	6	6.1
	Teneligliptin + Metformin	8	8.2
	Voglibose + Glimepiride	1	1
	Acarbose + Metformin	1	1
	Glimepiride + Metformin	23	23.5
	Teneligliptin	3	3.1
	Metformin	36	36.7
Therapy Regimens	Dual therapy	-	41.8
	Monotherapy	-	39.7
	Triple therapy	-	18.3

Table 4: Diabetic complications experienced by the patients.

Complication	Percentage (%)
Retinopathy	7.1
Nephropathy	4.1
Diabetic ketoacidosis	3.1
Neuropathy	2
Myopathy	1

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DISCUSSION

The research study, which included 98 participants, most of whom were between the ages of 41 and 60 (68.3%), emphasizes the higher incidence of diabetes in middle-aged populations, which is in line with studies that indicate an increased risk of type 2 diabetes with advancing age. A considerable proportion of participants had poor glycemic control, according to blood sugar measurements. 39.8% of people with random blood sugar (FBS) values were over 250 mg/dL, and 87.8% people with fasting blood sugar (FBS) levels were over 126 mg/dL, both of which are indicates of poorly managed diabetes. A second indication of poor glycemic control was provided by postprandial blood sugar (PPBS) readings, which revealed that 67.3% of subjects had readings above 200 mg/dL.

Metformin was prescribed as a monotherapy to 36.7% of participants, according to treatment patterns, indicating that this medication is first-line for the management of type 2 diabetes. Metformin combination medications, such those combining glimepiride and Voglibose, were frequently used by patients who needed better glycemic control. Notably, 70.4% of patients had drug interactions, most likely as a result of polypharmacy for the treatment of comorbid conditions such hypertension and hyperlipidemia and diabetes. For patients receiving several treatments, the risk of nephrotoxicity (5.1%) and serotonin syndrome (6.1%) was brought up.

Mild to severe side effects were common in 36.7% of participants who experienced adverse drug reactions (ADRs). To improve treatment tolerability, it is essential to implement tailored dose, meticulous drug monitoring, and patient education regarding medication adherence and adverse effects.

The study also found that retinal (7.1%) and nephropathy (4.1%) were common diabetes-related problems. These findings highlight the necessity of comprehensive care that extends beyond glycemic control. In order to avoid serious consequences such as diabetic ketoacidosis and cardiovascular events, patients must receive tailored treatment, early screening, regular monitoring of their blood sugar and HbA1c levels, and patient education.

The study was conducted by Abidi et al., is coherent to our study where the age group of highest numbers of patients were in the age group 50-60 years (39.69%), in contrast our study is having 36(36.70%) of patients in the age group 51-50 years (13).

The study was conducted by Joshi et al., in that Out of 120 prescriptions of antidiabetic drugs studied, 57.5% were men and 42.5% were women, indicating the men predominated over women, in similar to our study 60.20% were men and 39.80% were women (2).

The study was conducted by Theivasigamani K et al., in this Majority of them had elevated fasting blood sugar (FBS) >110 mg/dl (97.74%), postprandial blood sugar (PPBS) >140 mg/dl (99.58%), and elevated HbA1c >7.5 (65.70%) and similar to our study elevated fasting blood sugar (FBS)>126 (87.8%), postprandial blood sugar (PPBS)>200 (67.3%), and elevated HbA1c>6.5% (83.7%) (7).

The study was conducted by Patel B et al., the major combinations of drugs prescribed was found to be Glimepiride + Metformin + Pioglitazone 8 (7.02%), Metformin + Vildagliptin 4 (3.51%) and Metformin was prescribed as monotherapy in 40.35% patients, in contrast our study shows combinations of Glimepiride + Metformin + Pioglitazone 6(6.10%), Metformin + Vildagliptin 6(6.10%) and Metformin was prescribed as monotherapy in 36(36.70%) patients (15).

The study was conducted by kalam et al., is similar to our study where the number of patients (12%) were having diabetic retinopathy and 3% of patients are having diabetic ketoacidosis (16).

CONCLUSION

The demographics, glycemic control, treatment regimens, and diabetic complications among 98 patients are all insightfully summarized in this study. There is a concentration of patients between the ages of 41 and 60, with men making up the majority (60.20%) in the age distribution. Glycemic control across various indicators-random blood sugar (RBS), fasting blood sugar (FBS), postprandial blood sugar (PPBS), and HbA1c-demonstrates an important number of patients experiencing poor diabetes management. Interestingly, 83.70% of patients had HbA1c levels higher than 6.5%, indicating persistent hyperglycemia and a higher risk of complications from diabetes.

Metformin is a key component of diabetic care, according to treatment analysis, with 36.70% of patients obtaining it as monotherapy and another 23.50% using it in conjunction with glimepiride. The most common strategy is dual therapy (41.80%), which is closely followed by monotherapy (39.70%). The rarity of triple therapy highlights the desire for more straight forward treatment plans.

Problems including diabetic ketoacidosis (3.10%), nephropathy (4.10%), and retinopathy (7.10%) demonstrate the possible long-term effects of insufficient glycemic management. Complications are still common despite advancements in treatment, highlighting the need for better disease control and early intervention.

The study's overall findings highlight the difficulty in managing diabetes in clinical settings, as many patients have high blood sugar levels and related problems. To reduce problems and boost quality of life, it necessitates improved treatment plans, patient education, and routine monitoring.

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REFERENCES

1. Verma S, Joshi Y, Singh A. Drug Utilization Evaluation of Anti-Diabetic Medication through Prescription Monitoring. Asian Journal of Pharmaceutical Research and Development. 2019 Jun 14;7(3):75–7.

2. Alam MS, Aqil M, Shah Qadry SA, Kapur P, Pillai KK. Utilization Pattern of Oral Hypoglycemic Agents for Diabetes Mellitus Type 2 Patients Attending Out-Patient Department at a University Hospital in New Delhi. Pharmacology & Pharmacy. 2014;05(07):636–45.

3. Sapra A, Bhandari P. Diabetes Continuing Education Activity [Internet]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK551501/

4. Hannan A, Sinha SR, Ganiyani MA, Pustake M. Drug Utilization Study of Antidiabetic Drugs in Patients Attending Geriatric Outpatient Department in Tertiary Care Hospital. Cureus. 2021 Aug 30;

5. SYED WAJID, MENAKA M, FAZIL AHMED, SANA SAMREEN. A LITERATURE REVIEW ON ORAL HYPOGLYCEMIC DRUGS – MECHANISTIC ASPECTS. Asian Journal of Pharmaceutical and Clinical Research. 2019 Oct 1;5–10.

6. Ganesan K, Muhammad ;, Majeed B, Senan R; Oral Hypoglycemic Medications Continuing Education Activity [Internet]. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482386/

7. Theivasigamani K, Palaniappan S. Drug Utilization Evaluation of Antidiabetic Agents in Primary Care Clinics of a South Indian Rural Province. International Journal of Pharmaceutical Research And Allied Sciences. 2022 Nov 9;11(4):1–13.

8. Ceriello A, Prattichizzo F. Variability of risk factors and diabetes complications. Vol. 20, Cardiovascular Diabetology. BioMed Central Ltd; 2021.

9. Ali A, Alfajjam S, Gasana J. Diabetes Mellitus and Its Risk Factors among Migrant Workers in Kuwait. Int J Environ Res Public Health. 2022 Apr 1;19(7).

10. Xie X, Wu C, Hao Y, Wang T, Yang Y, Cai P, et al. Benefits and risks of drug combination therapy for diabetes mellitus and its complications: a comprehensive review. Vol. 14, Frontiers in Endocrinology. Frontiers Media SA; 2023.

11. Choi JH, Kim HR, Song KH. Musculoskeletal complications in patients with diabetes mellitus. Vol. 37, Korean Journal of Internal Medicine. Korean Association of Internal Medicine; 2022. p. 1099–110.

12. Ramachandran S, Swethanjali D, Bindu MH, Devaki K, Sripada R, Srinivas ED, Chakravarthy M, Dhanaraju MD. Drug Utilization Evaluation On Antidiabetic, Thyroid and Antithyroid Drugs. Biomedical and Pharmacology Journal. 2020 Dec 1;13(4):1839-45.

13. Abidi A, Rizvi DA, Ahmad A. Pharmacoeconomic and drug utilization study of antidiabetic therapy in a tertiary care teaching hospital of northern India. Asian journal of pharmaceutical and clinical research. 2016 May 1:371-5.

14. Khalam A, Dilip C, Shinu C. Drug use evaluation of diabetes mellitus in hospitalized patients of a tertiary care referral hospital. Journal of basic and clinical physiology and pharmacology. 2012 Nov 1;23(4):173-7.

15. Patel B, Oza B, Patel K, Malhotra S, Patel V. Pattern of antidiabetic drugs use in type-2 diabetic patients in a medicine outpatient clinic of a tertiary care teaching hospital. Int J Basic Clin Pharmacol. 2013;2(4):485.

16. Khalam A, Dilip C, Shinu C. Drug use evaluation of diabetes mellitus in hospitalized patients of a tertiary care referral hospital. J Basic Clin Physiol Pharmacol. 2012 Nov;23(4):173–7.