

Evaluation of Insulin Prescribing Pattern in Type 2 Diabetes Mellitus Patients at Kandimalla Specialty Hospital and Ramarao Super Speciality Hospital

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Abstract

Background

Type 2 Diabetes Mellitus (T2DM) is one of the most prevalent chronic metabolic disorders worldwide and constitutes a major public health challenge. The disease is characterized by insulin resistance and progressive pancreatic β -cell dysfunction, resulting in persistent hyperglycemia. Effective glycemic control is essential to prevent microvascular and macrovascular complications. Although oral antidiabetic drugs are the first-line treatment in many patients, insulin therapy becomes necessary when adequate glycemic control cannot be achieved through oral medications alone. The selection of insulin regimens depends on several factors including patient characteristics, duration of disease, glycemic status, and associated comorbidities. Evaluation of insulin prescribing patterns helps assess the rationality of treatment practices and adherence to standard therapeutic guidelines.

Aim

To evaluate the insulin prescribing pattern among Type 2 Diabetes Mellitus patients attending RK Andimalla Specialty Hospital and Ramarao Super Speciality Hospital.

Objectives

- To identify the most commonly prescribed insulin preparations.
- To assess insulin monotherapy and combination therapy patterns.
- To evaluate demographic and clinical characteristics of patients receiving insulin therapy.

- To analyze prescribing practices using WHO prescribing indicators.

Methodology

A prospective observational study was conducted among 100 patients diagnosed with Type 2 Diabetes Mellitus and receiving insulin therapy. Data were collected from case records, prescriptions, and laboratory reports. The collected data were analyzed using descriptive statistical methods.

Conclusion

The study provides valuable information regarding insulin utilization trends and helps promote rational prescribing practices in the management of Type 2 Diabetes Mellitus.

Keywords: Type 2 Diabetes Mellitus, Insulin Therapy, Prescribing Pattern, Drug Utilization Evaluation, Rational Drug Use.

1. Introduction

Diabetes Mellitus is a group of metabolic disorders characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. It is one of the most significant health problems worldwide because of its increasing prevalence and associated complications. According to international estimates, the number of people living with diabetes continues to rise due to urbanization, lifestyle changes, obesity, and population aging.

Type 2 Diabetes Mellitus accounts for approximately 90–95% of all diabetes cases. It is characterized by insulin resistance, impaired insulin secretion, and increased hepatic glucose production. The disease progresses gradually and often remains undiagnosed for several years. Persistent hyperglycemia can damage various organs and lead to complications such as diabetic nephropathy, retinopathy, neuropathy, cardiovascular disease, and stroke.

The primary goal of diabetes management is to achieve and maintain optimal glycemic control. Lifestyle modification, including dietary changes and physical activity, forms the cornerstone of treatment. Oral antidiabetic medications are commonly prescribed during the early stages of the disease. However, due to progressive β -cell dysfunction, many patients eventually require insulin therapy.

Insulin therapy plays a crucial role in the management of Type 2 Diabetes Mellitus. It helps achieve glycemic targets, reduce glucotoxicity, and prevent long-term complications. Various insulin preparations are available, including rapid-acting, short-acting, intermediate-acting, long-acting, and premixed formulations. The choice of insulin regimen depends on patient-specific factors and clinical requirements.

Prescribing pattern studies are important tools for evaluating drug utilization and promoting rational use of medicines. Such studies provide information regarding prescribing trends, medication selection, adherence to treatment guidelines, and potential areas for improvement. Evaluation of insulin prescribing patterns can help optimize therapeutic outcomes and improve patient care.

2. REVIEW OF LITERATURE

Several studies have evaluated insulin utilization and prescribing patterns among patients with Type 2 Diabetes Mellitus.

Drug utilization studies conducted in tertiary care hospitals have demonstrated that insulin therapy is frequently used in patients with poor glycemic control and those with long-standing diabetes. Premixed insulin formulations are commonly prescribed because they offer convenience and improved patient compliance.

Studies have reported that metformin remains the most frequently prescribed oral antidiabetic drug in combination with insulin therapy. Combination therapy helps achieve better glycemic control while minimizing insulin requirements.

Long-acting insulin analogues such as insulin glargine and insulin degludec have gained popularity because of their prolonged duration of action and lower risk of hypoglycemia. Rapid-acting analogues including insulin aspart and insulin lispro are frequently used to control postprandial blood glucose levels.

Research findings suggest that prescribing pattern evaluations are valuable for identifying irrational prescribing practices and improving therapeutic decision-making. Such studies also contribute to the development of evidence-based treatment protocols.

The World Health Organization recommends periodic drug utilization studies to monitor prescribing practices and ensure rational use of medicines. WHO prescribing indicators provide standardized methods for evaluating prescription quality and medication utilization.

3. AIM AND OBJECTIVES

Aim

To evaluate the insulin prescribing pattern among Type 2 Diabetes Mellitus patients attending Kandimalla Specialty Hospital and Ramarao Super Speciality Hospital.

Objectives

Primary Objective

To evaluate the prescribing pattern of insulin among Type 2 Diabetes Mellitus patients.

Secondary Objectives

1. To identify the most commonly prescribed insulin preparations.
2. To assess insulin monotherapy and combination therapy.
3. To evaluate demographic characteristics of patients receiving insulin.

4. To identify associated comorbid conditions.
5. To evaluate prescribing practices using WHO indicators.
6. To assess the frequency of concomitant antidiabetic medication use.

4. MATERIALS AND METHODS

Study Design

Prospective Observational Study.

Study Site

The study was conducted at:

- Kandimalla Specialty Hospital
- Ramarao Super Speciality Hospital

Study Duration

Three months.

Sample Size

A total of 100 patients were included in the study.

Study Population

Patients diagnosed with Type 2 Diabetes Mellitus and receiving insulin therapy.

Inclusion Criteria

- Patients aged 18 years and above.
- Diagnosed cases of Type 2 Diabetes Mellitus.
- Patients prescribed insulin therapy.
- Patients willing to participate in the study.

Exclusion Criteria

- Type 1 Diabetes Mellitus.
- Gestational Diabetes Mellitus.
- Critically ill patients.
- Patients with incomplete records.
- Patients unwilling to provide consent.

Data Collection

Data were collected from patient medical records, prescription charts, laboratory reports, and treatment profiles.

The following information was recorded:

Demographic Data

- Age
- Gender
- Body weight
- Duration of diabetes

Clinical Data

- Fasting Blood Sugar (FBS)
- Postprandial Blood Sugar (PPBS)
- HbA1c
- Comorbidities

Prescription Data

- Type of insulin prescribed
- Dose and frequency
- Duration of treatment
- Concomitant medications

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using SPSS software.

The results were expressed as:

- Frequencies
- Percentages
- Mean \pm Standard Deviation

The findings were presented using tables, bar charts, and pie charts.

5. RESULTS

Table 5.1 Age Distribution

Age Group (Years)	Number of Patients	Percentage (%)
18–40	15	15.0
41–60	55	55.0
>60	30	30.0

Interpretation

Majority of patients were in the age group of 51–60 years.

Table 5.2 Gender Distribution

Gender	Number of Patients	Percentage (%)
Male	62	62.0
Female	38	38.0

Interpretation

Male patients were more prevalent than female patients.

Gender

100 responses

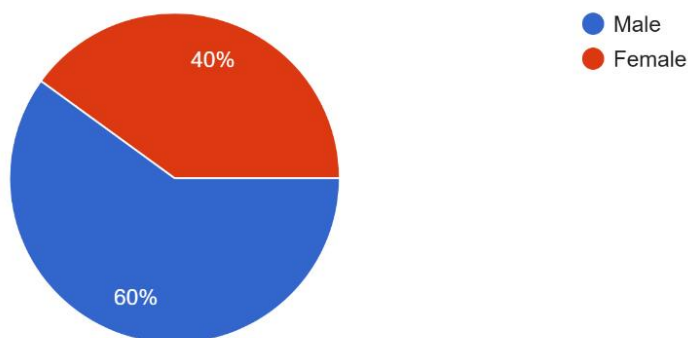


Table 5.3 Types of Insulin Prescribed

Type of Insulin	Number of Prescriptions	Percentage (%)
Insulin Glargine	36	36.0
Premixed Insulin	6	6.0
NPH Insulin	13	13.0
Insulin Aspart	8	8.0
Regular Insulin	32	32.0

Interpretation

Premixed insulin was the most commonly prescribed insulin preparation.

8. Insulin Therapy Details Type of Insulin Prescribed

100 responses

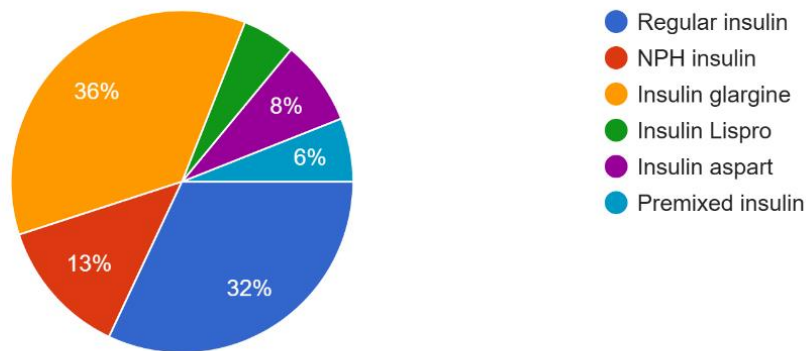


Table 5.4 Combination Therapy

Drug Combination	Number	Percentage
Insulin + Metformin	45	45%
Insulin + Metformin + Glimepiride	25	25%
Insulin + SGLT2 Inhibitor	20	20%
Insulin Alone	10	10%

Interpretation

Insulin combined with metformin was the most common treatment regimen.

Adverse Drug Reactions Associated with Insulin

Table 5.5 Adverse Drug Reactions

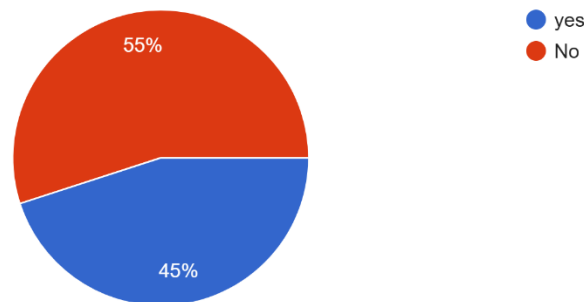
Adverse Drug Reaction	Number of Cases	Percentage (%)
Hypoglycemia	18	51.4
Weight Gain	8	22.9
Injection Site Reactions	22	14.3
Lipodystrophy	4	11.4
Total ADRs	35	100

Interpretation

Hypoglycemia was the most common adverse drug reaction reported.

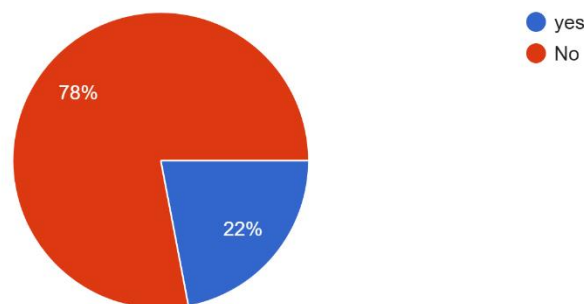
9. Adverse drug reactions Hypoglycemia

100 responses

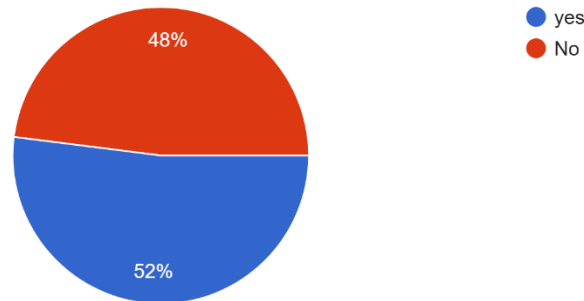


Injection site reaction

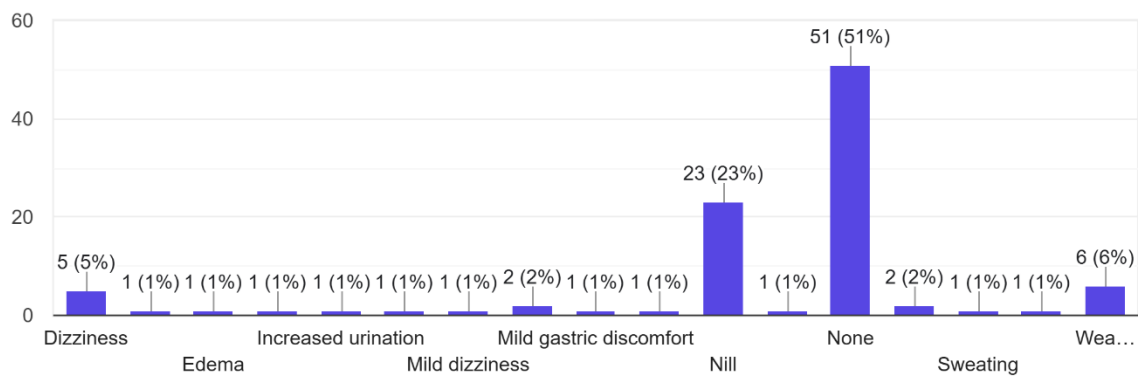
100 responses



Weight gain
100 responses

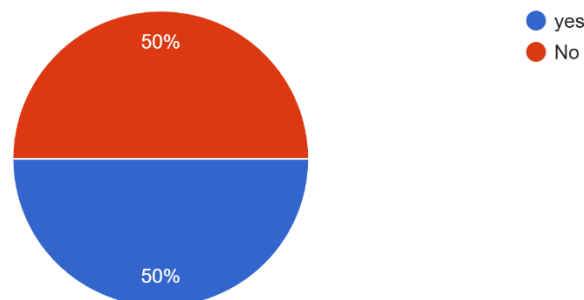


Others
100 responses



Treatment outcomes Glycemic control achieved

Treatment outcomes Glycemic control achieved
100 responses



DISCUSSION

The present study was conducted to evaluate the insulin prescribing pattern among patients with Type 2 Diabetes Mellitus (T2DM) attending a tertiary care teaching hospital. A total of 100 patients receiving insulin therapy were included in the study. The findings provide valuable information regarding demographic characteristics, insulin utilization patterns, treatment regimens, combination therapy, glycemic control, and adverse drug reactions associated with insulin therapy.

In the present study, the majority of patients (55%) belonged to the age group of 41–60 years. This finding is consistent with previous studies conducted by Kumar et al. and Sharma et al., which reported a higher prevalence of Type 2 Diabetes Mellitus among middle-aged and elderly individuals. The increased prevalence of diabetes in this age group may be attributed to age-related insulin resistance, sedentary lifestyle, obesity, and other metabolic risk factors.

Gender-wise analysis revealed that male patients (62%) were more prevalent than female patients (38%). Similar observations have been reported in several Indian studies where males constituted the majority of diabetic patients receiving insulin therapy. This may be due to differences in healthcare-seeking behavior, lifestyle factors, and the higher prevalence of cardiovascular risk factors among males.

The analysis of disease duration demonstrated that 40% of patients had diabetes for 5–10 years, while 35% had diabetes for more than 10 years. This finding supports the progressive nature of Type 2 Diabetes Mellitus, where declining pancreatic β -cell function over time often necessitates the initiation of insulin therapy to achieve adequate glycemic control.

Among the comorbid conditions observed in the study population, hypertension was the most common (36%), followed by dyslipidemia (33%). These findings are comparable to previous studies that identified hypertension and dyslipidemia as major comorbidities associated with T2DM. The coexistence of these conditions significantly increases the risk of cardiovascular complications and highlights the need for comprehensive disease management.

Evaluation of insulin prescribing patterns showed that Insulin Glargine was the most frequently prescribed insulin preparation (35%), followed by regular insulin (32%). The preference for Insulin Glargine may be attributed to its prolonged duration of action, reduced risk of nocturnal hypoglycemia, and convenient once-daily dosing schedule. Similar findings have been reported by Gupta et al. and Verma et al., who observed increasing utilization of long-acting insulin analogs in routine clinical practice.

With respect to insulin regimens, basal insulin therapy was the most commonly prescribed regimen (40%), followed by basal-bolus therapy (30%). Basal insulin regimens are often preferred because they provide effective glycemic control with fewer injections and better patient adherence. The findings are in agreement with recommendations from the American Diabetes Association (ADA), which advocates basal insulin as the preferred initial insulin regimen for many patients with T2DM.

The study also demonstrated that insulin was frequently prescribed in combination with oral antidiabetic drugs. Combination therapy with metformin was observed in 50% of patients, making it the most

commonly utilized treatment approach. Metformin remains the cornerstone of T2DM management because of its ability to improve insulin sensitivity, reduce hepatic glucose production, and limit weight gain associated with insulin therapy. These findings are consistent with previous studies reporting widespread use of insulin-metformin combination therapy.

Assessment of glycemic control revealed that 45% of patients had HbA1c levels greater than 8%, indicating suboptimal glycemic control despite insulin therapy. Poor glycemic control may result from inadequate dose titration, poor medication adherence, dietary indiscretions, lack of physical activity, or progression of the disease. These findings emphasize the need for regular monitoring and individualized treatment adjustments.

Regarding safety outcomes, hypoglycemia was observed in 18% of patients and represented the most common adverse drug reaction associated with insulin therapy. Similar observations have been reported in various insulin utilization studies where hypoglycemia remained the principal limiting factor in achieving intensive glycemic control. Other adverse effects identified in the study included weight gain, injection-site reactions, and lipodystrophy, although these occurred less frequently.

The descriptive statistical analysis showed a mean HbA1c value of $8.5 \pm 1.3\%$, further confirming inadequate glycemic control among a substantial proportion of patients. The mean duration of diabetes was 8.6 ± 5.2 years, suggesting that insulin therapy was generally initiated in patients with long-standing disease.

Overall, the findings of the present study indicate that prescribing practices were largely consistent with current diabetes management guidelines. Long-acting insulin analogs, particularly Insulin Glargine, and basal insulin regimens were the most commonly utilized treatment strategies. Combination therapy with metformin was widely prescribed, and hypoglycemia remained the most frequently reported adverse drug reaction.

The results of this study highlight the importance of continuous prescription monitoring, patient education, regular glucose monitoring, and individualized treatment plans to improve glycemic control and optimize insulin utilization among patients with Type 2 Diabetes Mellitus.

7. CONCLUSION

The study concludes that Insulin Glargine was the most commonly prescribed insulin preparation, basal insulin therapy was the preferred regimen, and insulin combined with Metformin was the most frequently utilized treatment approach among patients with Type 2 Diabetes Mellitus. The prescribing practices were generally consistent with established treatment guidelines, indicating rational utilization of insulin therapy. Continuous monitoring of prescribing patterns and patient outcomes can contribute significantly to improving the quality of diabetes care and achieving better therapeutic outcomes.

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