

A Study on Prescribing Patterns of Anti-Diabetic Drugs in Type 2 Diabetic Patients

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Abstract

Objective: The main objective of the study is to assess the prescribing patterns of antidiabetic drugs in type 2 diabetic patients.

Methodology: A prospective observational study was conducted in Department of Endocrinology in Sri Care Hospitals, Narasaraopet for a period of 6 months. Patient of both genders who were diagnosed with diabetes were included in the study.

Results: A total of 150 patients were recruited for the study, 53.34% of the patients were males and 46.66% of the patients were females. Most of the patients were in the age group of 50-59 years i.e 28.6%. This study also revealed the common predominant comorbid condition of 30% with diabetes mellitus. In this study different therapy observed for monotherapy is Insulin in 21 (46.67%), dual therapy is Metformin & Glimepiride in 32 (46.38%), and triple therapy is Metformin + Glimepiride + Voglibose in 22 (61.12%) patients.

Conclusion: This study concludes that prescriptions were rational. Current investigation focussed on rational choice of drug based on demographic data, associated conditions and complications would give additional insights into prescribing patterns in diabetes mellitus.

Keywords: Type 2 Diabetes Mellitus, FBS, PPBS, HbA1C and Co-morbidities.

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INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin. Insulin is a hormone that regulates blood glucose.^[1]

Hyperglycemia also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body systems, especially the nerves and blood vessels.^[2]

- Risk factors: Family history, Obesity, Lack of exercise, Age.^[3]
- Signs and Symptoms include Increased thirst, Frequent urination, Increased hunger, Unintended weight loss, Fatigue, Blurred vision, Slow healing power.^[4]
- Complications include Hyperosmolar hyperglycemic State, Diabetic Keto Acidosis, Eye problem, Foot Problems, Heart Attack and Stroke, Kidney Problems (Nephropathy).^[5]
- It can be diagnosed by HbA1C Test, Glucose tolerance test, Fasting blood sugar, Random blood sugar.

MATERIALS AND METHODS

Study Design

A hospital based prospective observational study.

Study Site

The study was conducted at Sri Care hospitals, Narasaraopet. The patients who visit this hospital are usually from in and around the districts of Palnadu, Guntur and Prakasam

Study Period

This study was conducted over a Period of 6 months.

Sample Size

Total of 150 subjects with type 2 diabetes mellitus were included in the study. Those who fulfilled the inclusion and exclusion criteria were selected for the study.

Inclusion Criteria

- Patients with type -2 diabetes mellitus only.
- Patients of both genders.

- Patients with type-2 diabetes along with other comorbidities.^[1-3]

Exclusion Criteria

- Pregnant women and lactating mothers.^[6]
- Patients with psychiatric problems.^[7]
- People using Ayurveda and homeopathic medicines
- Neonates and children are excluded.

RESULTS AND DISCUSSIONS

Age Wise Distribution of Diabetic Patients

Age wise distribution of diabetes among the selected subjects are shown in Figure 1, individuals of the age groups 50 – 59 years has the highest incidence of diabetes (n=43), Followed by age group 40-49 (n=36), Followed by age group 60-69 (n=34), Followed by age group 30-39 (n=21), Followed by age group 70-80 (n= 11) and the patients between the age group 20-29 has the lowest incidence of diabetes (n=5).

Gender wise distribution of diabetic patients

Gender wise distribution of diabetes among the selected subjects are shown in Figure 2. Among 150 subjects 80 were males and 70 were females it means the incidence of diabetes is more in males when compared to females.

Distribution of diabetic patients based on occupation

Occupation wise distribution of diabetes among the selected subjects shown in Figure 3, among 150 individuals people who are farmer by occupation has the highest incidence of diabetes (n=30) in this female are n=0, Males are more n= 30. And in these patients who are students has the lowest incidence of diabetes (n=1) in these females are n=0, Males are more n= 1.

Distribution of diabetic patients based on BMI

BMI wise distribution of diabetic patients among selected subjects are shown in Figure 4, among 150 individuals of having BMI 25-29.9 has the highest number of patients (n=67), followed by BMI of 30-34.9 & 18.5-24.9 (n=32), followed by BMI of 35-39.9 (n=13), followed by BMI of < 18.5 (n=4), followed by BMI of above 40 (n= 2)

Distribution of diabetic patients based on social history

Diabetic patients has been distributed based on their social history among the selected subjects are shown in Figure 5. Patients who are non-smoker and non-alcoholic has the more incidence of diabetes (n=76), followed by patients who are both alcoholic and smoker (n=17), followed by patients who are only alcoholic (n=5), the patients who are who are only smokers has the lowest incidence of diabetes (n=2)

Results of study population of diabetic patients with comorbid conditions

Comorbidities conditions wise distribution of diabetes among selected are shown in Figure 6. Individuals among 150 the patients with no comorbidities are more (n=74) and the patients with pulmonary tuberculosis are less in number (n=1)

Distribution of patients based on FBS values

FBS range wise distribution of diabetes among selected are shown in Figure 7. Individuals among 150 the patients FBS ranging >110 mg/dl (n=142) are more in number, and the FBS ranging between 70-110 mg /dl (n=8) are less in number

Distribution of patients based on PPBS values

PPBS range wise distribution of diabetes among the selected subjects are shown in Figure 8. Individual among 150 the patients with PPBS range >160 mg/dl (n=5%) are more in number, and the patients with PPBS range 110-160 mg /dl are less in number (n=3.33%)

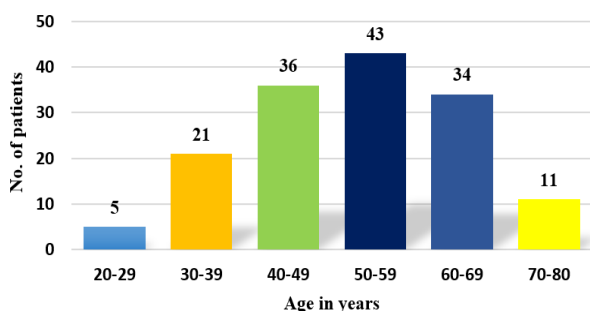


Figure 1: Age wise distribution of diabetes patients

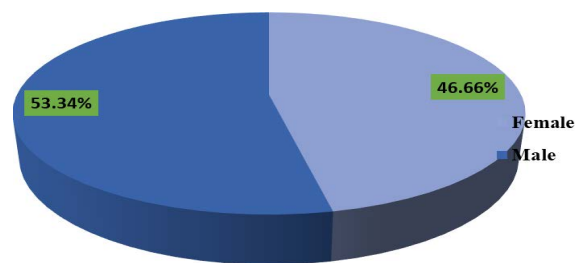


Figure 2: Gender wise distribution of diabetes patients

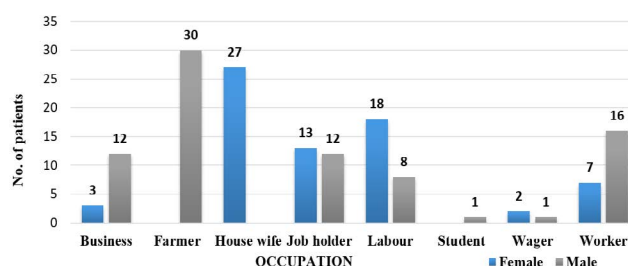


Figure 3: Distribution of diabetes patients based on occupation

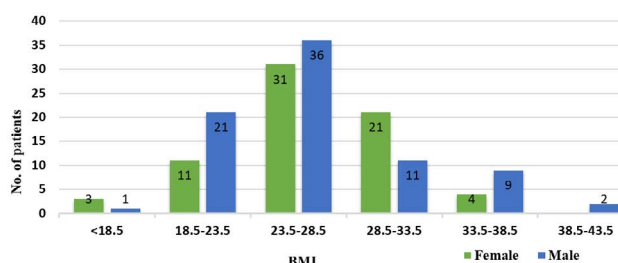


Figure 4: Distribution of diabetes patients based on BMI

Distribution of patients based on HbA1C levels

HbA1C level wise distribution of diabetes among the selected subjects are shown in Figure 9. Among 150 individuals patients who has HbA1C levels between 10.7-15.7% (n=131) are more in number, followed by pre diabetic patients HbA1C between 5.7 – 6.4 % (n=15) then followed by patients having normal levels of HbA1C between < 5.7 % (n=4) are less in number.

Categorization of study population based on the severity of the diabetes according to their blood glucose parameters (FBS, PPBS, HbA1C)

Discusses about the categorization of study population based on the severity of the diabetes according to their blood glucose parameters (FBS, PPBS, HbA1C) are shown in Figure 10. In this 142 patients were diagnosed with diabetes based on FBS, 145 Patients diagnosed with diabetes based on PPBS and 131 patients diagnosed with diabetes based on HbA1

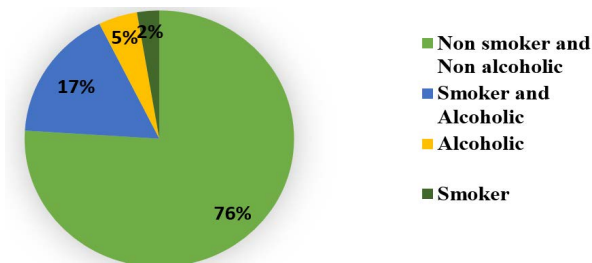


Figure 5: Distribution of diabetes patients based on social history

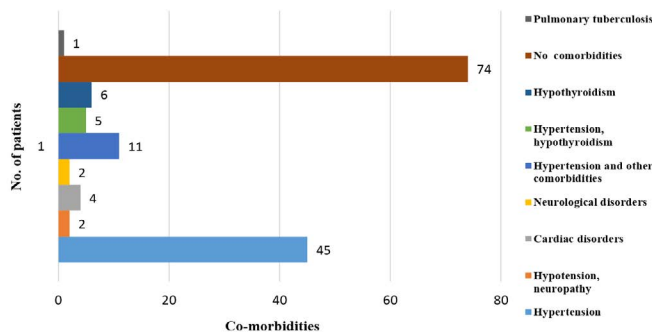


Figure 6: Results of study population of diabetic patients with comorbid conditions

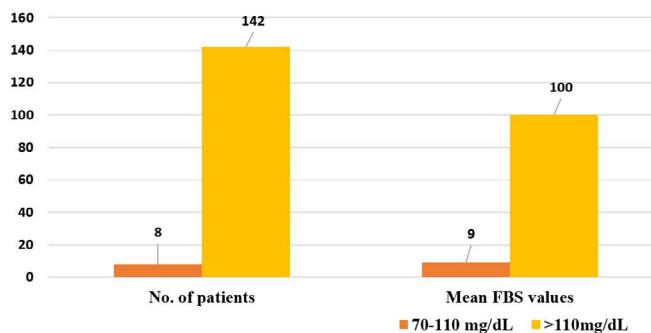


Figure 7: Distribution of patients based on FBS values

Results of treatment regimen of diabetes patients based on type of treatment

Based on type of treatment received by diabetic patients has been distributed among the selected are shown in Figure 11. Individuals among 150 patients who are taking oral hypoglycemic agents are more in number (n=117), followed by patients taking insulin alone (n=24), then patients who are taking both oral hypoglycemic agents and insulin are less in number (n=9)

Distribution of diabetic patients based on types of therapy

Diabetic patients receiving different types of medication has been distributed among the selected shown in Figure 12. Individuals among 150 the patients who are receiving the dual therapy are more in number (n=69), followed by patients receiving mono therapy (n=45), followed by patients receiving triple therapy are less in number (n=36).

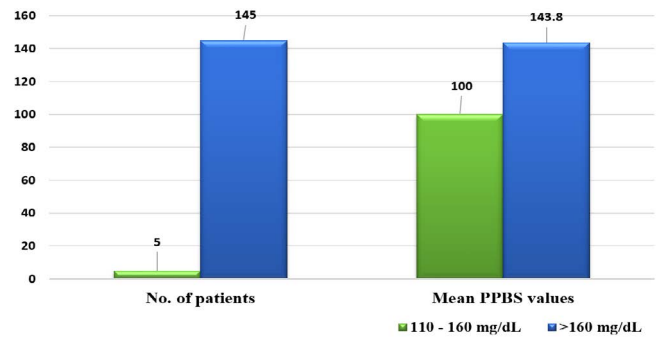


Figure 8: Distribution of patients based on PPBS value

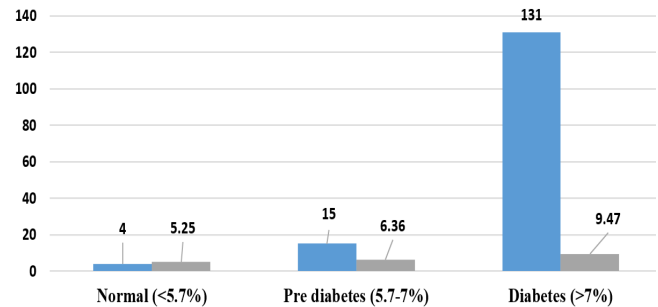


Figure 9: Distribution of patients based on HbA1C values

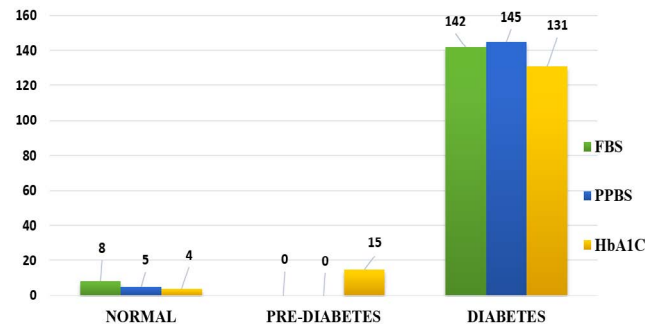


Figure 10: Categorization of study population based on the severity of the diabetes according to their blood glucose parameters (FBS, PPBS, HbA1C)

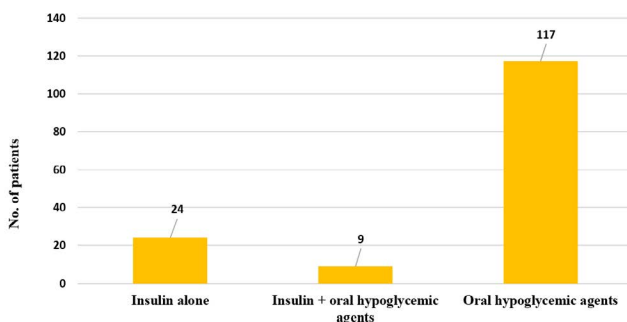


Figure 11: Results of treatment regimen of diabetes patients based on type of treatment

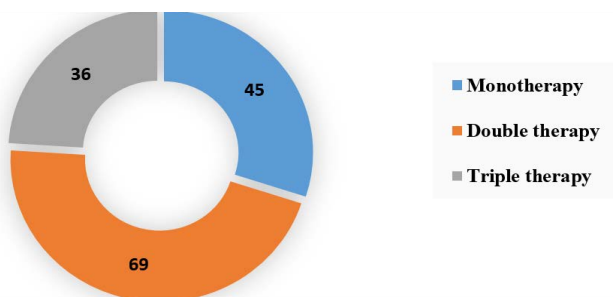


Figure 12: Distribution of diabetes patients based on types of therapy

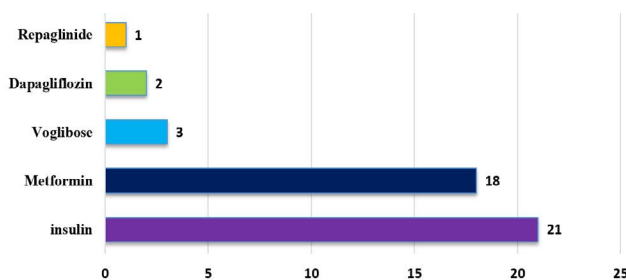


Figure 13: Prescription pattern & prescribed drugs distribution for diabetic medication based in monotherapy

Prescription pattern & prescribed drugs distribution for diabetic medication based in monotherapy

Patients receiving monotherapy has been distributed among selected are shown in the Figure 13, Individuals among 45 the patients who are receiving only insulin are more in number (n=21), and the patients receiving Repaglinide are low in number (n=1).

Prescription pattern and prescribed drugs distribution of diabetic medication based on double therapy

Patients receiving double therapy has been distributed among the selected are shown in Figure 14. Individuals among 69 the patients who are receiving the combination of Metformin + Glimepiride are more in number (n=32). And patients who are receiving the combination of both insulin + metformin & Glimepiride + Voglibose are less in number (n=1)

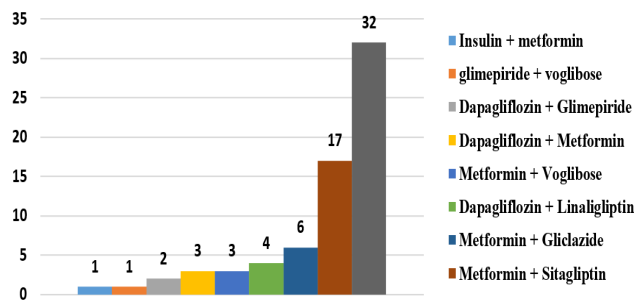


Figure 14: Prescription pattern and prescribed drugs distribution of diabetic medication based on double therapy

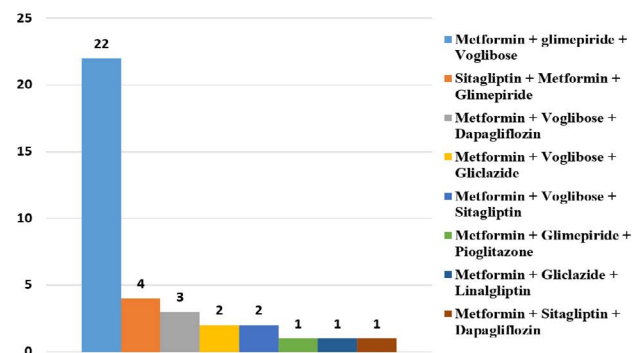


Figure 15: Prescription pattern and prescribed drugs distribution of diabetic medication based on triple therapy

Prescription pattern and prescribed drugs distribution of diabetic medication based on triple therapy

Patients receiving triple therapy has been distributed among the selected has been shown in Figure 15. Individuals among 150 the patients who are receiving the combination of Metformin + Glimepiride + Voglibose has the highest number (n=22), the patients who are receiving the combination of Metformin+ Glimepiride + Pioglitazone & Metformin + Gliclazide + Linaligliptin & Metformin + Sitagliptin + Dapagliflozin has the lowest number (n=1).

Discussion

Our study provides the information on prescribing pattern of and treatment outcomes of antidiabetic drugs therapy. The study was also considered to be one of the most effective method to assess and to promote the rational use of drugs in hospital settings.

Diabetes mellitus is a major public –health problem over world-wide. Its prevalence was rising in many parts of the developing world and in India there is no exception to this. Individuals with Type 2 diabetes were considered on high priority as they are potential can diabetes for rapid evaluation to prevent and halt the progression of many complications.

ype 2 diabetes is a chronic disease requiring lifelong treatment. Although life style modification plays an important role in managing diabetes, the usage of medication became unavoidable in many patients. A prescription-based study

was considered as one of the most effective methods to assess and to evaluate the prescribing patterns of medication.

This study reveals that maximum numbers of patients were in the age group of 50-59 years because in that age there will be increase in insulin resistance as there will be decrease in pancreatic function. Our study shows that, Diabetes is always being dominating in males as compared to females because of underlying factors like lack of physical activities, work stress, smoking & drinking etc.,

In the present study, nearly patients having BMI between 25-29.9 are more prone to diabetes because of more fat deposition and lack of physical activity. Patients with a long duration of diabetes are at a higher risk of developing complications. This study also revealed nearly 70% of patients are with comorbidities like hypertension, neuropathy, cardiac diseases, and pulmonary tuberculosis.

Majority of the patients who are farmers by occupation are more prone to diabetes and patients who are students by occupation are less prone to diabetes because of genetic factors & their food habits. And the patients who don't consume either alcohol or non smokers are majorly suffering with diabetes.

There are more class of anti-diabetic drugs are present the choices antidiabetic drugs depends on the type of patients, their concurrent illness, as well as availability of medicines. In general, Metformin is considered as a safer drug intern of hypoglycaemia as it has glucose lowering effects by inhibiting hepatic gluconeogenesis and opposing the action of glucagon.

In our study, the patients were treated with mono therapy, dual therapy, and triple therapy where single ADDs and three ADDs respectively were used, this is due to the severity and condition of the diabetes along with other comorbidities or complications. The study revealed that, mostly acceptable treatment for older diabetic type 2 patients is done by single therapy only and that is insulin therapy. A study concluded that Metformin and Glimepiride is also most common drug of choice when compared to single therapy dual therapy and triple shows more effectiveness.

In our study, the patients who has the FBS ranging >110 mg/dl are more in number (n=142), and the patients with RBS ranging >180 are more in number (n=117), and the patients with PPBS ranging >160 mg/dl are more in number (n=145).

According to this study finding, the most common and accepted dual therapy Anti diabetic drugs are in combination of biguanides & DPP4 Inhibitors 32 patients. The dual combination prescription products are available with many other categories of drugs like Biguanides such as metformin with DPP4 inhibitors and sglT2 inhibitors. The preferred choices of drugs in combination are Metformin + Glimepiride are 32 (21.33%). Metformin + sitagliptin are 17 (11.33%), Metformin + Gliclazide are 6 (4%), Metformin + Voglibose are 3 (2%). The combination of DPP4 inhibition and metformin has been shown to be highly tolerable with very low risk of hypoglycemia.

In this study triple therapy drugs are accounted to manage uncontrolled diabetes, these combinations were prescribed to 36 patients. The most preferred triple drug therapy combinations are Metformin + Glimepiride + Sitagliptin, and Metformin + Glimepiride + Voglibose.

In conclusion study showed the prescription patterns in practice for a large number of patients with Type 2 diabetes. In conclusion, the antidiabetic drugs which are prescribed more are Metformin, Glimepiride, Voglibose & insulin this combinations or monotherapy has achieved better glycemic control with increased use.

Conclusion

Now a day's type 2 diabetes mellitus is second leading disease in India. Diabetes mellitus is very common disorder in all population. Type 2 diabetes is the most common clinical form of world wide. Type 2 diabetes is frequently associated with other cardiovascular and renal risk factors. Its chronic complications increasing cost of care and impacting negatively on quality of life of people with this disease. To improve the treatment outcomes of diabetes and reduce the risk of complications with other diseases, we are using anti diabetes agent most of people are treated with oral hypoglycemic agents and followed by the combination of these drugs with insulin or only insulin.

In our study we conclude that, Fasting Blood Sugar (FBS) is more accurate & reliable parameter for diagnosis of T2DM. PPBS values interfere with food ingestion that may influence with blood glucose values with respect to time individually. Patient to patient individual variations will be more with PPBS values than FBS values.

We analysed the doses of different prescribed antidiabetic drugs, and evaluated the appropriateness of therapy. The present study showed the different prescription patterns in practice for a large number of patients with Type 2 diabetes.

In conclusion the selection of the antidiabetic prescribing drug is based on the diagnostic levels of FBS, PPBS & HbA1C.

Depending upon the severity of the disease status treatment strategy will varies from monotherapy to different combination therapies. Better therapeutic strategies will help the patient to achieve better glycemic controls and to achieve goals of the therapy.

In the dual drug therapies, widely used combination with better efficacy and with least complications was metformin and glimepiride compared to metformin alone or sulfonylureas alone. Among fixed drug combinations, prescription of Metformin + Glimepiride was the most common drug combination.

Rationality of the prescriptions was most important. Mainly our study focused on rational choice of drug based on demographic data, associated conditions and complications would give additional insights into prescribing patterns in diabetes mellitus. Rational prescription considers dose and duration as well as interacting with other medications. We found that therapeutic audit with more parameters of

analysis to provide regular feedback to reserachers and prescribers may encourage rational prescribing in diabetes mellitus.

A part from glycemic control, cardiovascular outcome trails have shown benefit of these days in decreasing the onset and severity of cardiovascular events. It is also shown to decrease the albuminuria and halt the progression of nephropathy.

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