



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2019; 8(3): 59-63

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www.thepharmajournal.com

Received: 04-01-2019

Accepted: 08-02-2019

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## Prescription preference of antidiabetic drugs among clinicians

**Dr. Sayan Das, Dr. AV Tilak, Dr. Nimish Narkar, Dr. Suresh Dange, Dr. BT Rane and Dr. Shrikrishna Shende**

#### Abstract

**Introduction:** Diabetes mellitus (DM) refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. The increased numbers of choices for treatment of DM have often left the practitioners without a clear pathway of therapy to follow. A practitioner cannot blindly follow a single protocol adapted from some guidelines. Thus, a prescription pattern among clinicians in Pimpri, Pune.

#### Aim & Objectives

- To study the overall utilization of various available therapies for diabetes mellitus
- To study the utilization pattern between monotherapy and combined therapies

**Material & Methods:** A cross sectional observational study for a period of 6 months among 100 clinicians/practitioners who treat patients of type 2 diabetes mellitus (T2DM) in Pimpri, Pune. It was a questionnaire based study. Institutional Ethics Committee (IEC) clearance was obtained before the start of the study. Written informed consent was obtained from all the subjects before participation and the questionnaire was provided to be filled by them.

**Results:** Overall metformin was the most preferred prescribed anti diabetic agent followed by sulphonylureas, thiazolidinediones,  $\alpha$ -glucosidase inhibitors and dipeptidyl peptidase 4 inhibitors. Metformin + sulphonylureas is the most preferred combination therapy. The most preferred insulin preparations are insulin mixtard (30/70). The practitioners preferred a double drug therapy over monotherapy or a triple drug therapy for treatment of type 2 diabetes mellitus patients.

**Keywords:** Diabetes, prescription pattern, drug utilisation study, metformin, pune, T2DM

#### Introduction

Diabetes mellitus refers to a group of common metabolic disorders that share the phenotype of hyperglycaemia. Factors contributing to hyperglycaemia seen in diabetes mellitus include reduced insulin secretion, decrease glucose utilization or increased glucose production<sup>[1]</sup>.

According to the International Diabetes Federation (IDF), diabetes mellitus is one of the leading causes of morbidity and mortality worldwide. In addition to the 415 million adults who are estimated to currently have diabetes, there are 318 million adults with impaired glucose tolerance, which puts them at high risk of developing the disease in the future. This is projected to increase to 642 million by the year 2040. With an estimated 69.1 million people living with diabetes in India, corresponding to 8.7% of India's adult population, India has the world's second largest diabetes population<sup>[2]</sup>.

Currently, the management of diabetes mellitus include, insulin, oral glucose lowering agents like sulphonylureas, biguanides, thiazolidinediones, glinides,  $\alpha$ -glucosidase inhibitors, dipeptidyl peptidase iv (DPP-4) inhibitors, and sodium glucose co-transporter 2 (SGLT-2) inhibitors, and parenteral drugs like amylin agonists and glucagon like peptide 1(GLP-1) receptor agonists. The increased numbers of choices for treatment of diabetes mellitus have often left the practitioners without a clear pathway of therapy to follow. Moreover, each of these classes of drugs has some limitations like hypoglycaemia, weight gain, peripheral oedema, abdominal discomfort etc.

Looking at these facts, one can safely conclude that one cannot blindly follow an iron-clad protocol adapted from some fancily named guidelines for treating each and every case. On the contrary, the treatment of diabetes mellitus should be custom made for individuals and be dynamic in nature with lots of scope for change as per needs.

Therefore, this study is a survey to evaluate the current prescribing pattern of anti-diabetic drugs in diabetic patients attending clinics in Pimpri, Maharashtra.

**AIM & objectives**

- To study the overall utilization of various available therapies for diabetes mellitus
- To study the utilization pattern between monotherapy and combined therapies

**Methodology**

Institutional Ethics Committee (IEC) clearance was obtained before the start of the study. The study was conducted as a cross sectional observational study for a period of 6 months among clinicians/practitioners who treat patients of type 2 diabetes mellitus (T<sub>2</sub>DM) in Pimpri, Pune. Sample size was 100 and the inclusion & exclusion criteria were as follows:

**Inclusion criteria**

- Practitioners who treat type 2 diabetic patients
- Registered Practitioners (Allopathy)

**Exclusion criteria**

- Practitioners who don't treat type 2 diabetic patients
- Practitioners unwilling to participate in the study

Written informed consent was obtained from all the subjects before participation and then a questionnaire was provided to the practitioners were filled by them instantly. The questionnaire is as follows:

**Prescription pattern audit for Type ii diabetes mellitus' Questionnaire**

1. How long have you been treating patients of diabetes?
2. What is the most common age group of patients that you treat?
  - a. Below 18 years
  - b. 18 – 30 years
  - c. 31 - 45 years
  - d. 46 - 60 years
  - e. Above 60 years
3. Is there any gender wise difference in the prevalence among the patients?
4. What is the first line of treatment that you prefer for a newly diagnosed diabetic patient?
5. What are the most common antidiabetic drugs prescribed by you?
6. What are the most common combinations of antidiabetic drugs prescribed by you?
7. What are the most common reasons for switching to Insulin preparations from OHAs?
8. What are the most common Insulin preparations prescribed by you?
9. Do you prescribe any alternative therapy (Homeopathy, Ayurvedic etc.)? If yes, please mention.
10. Do you advice lifestyle modifications? Does this affect the diabetes control?

The generic names of drugs noted in the questionnaire as brand names were obtained from the recent editions of current index of medical specialty and Indian drug review. This was done to prevent any confusion regarding the brand names. The data thus obtained were sorted and categorized. The data collected were analyzed for frequency, percentage, mean, and standard deviation. Statistical software used were Microsoft Office Excel 2007 and IBM SPSS Statistics version 2.0 (Statistical Package for the Social Sciences IBM

Corporation).

**Results**

A total of 100 questionnaires were filled by different practitioners/clinicians who treat diabetes mellitus patients in Pimpri, Maharashtra, after obtaining their consent.

The practitioners/clinicians selected in the study were allopathic doctors who treat patients of diabetes mellitus on a regular basis in Pimpri, Maharashtra. The details of the practitioners included in study have been tabulated in Table 1.

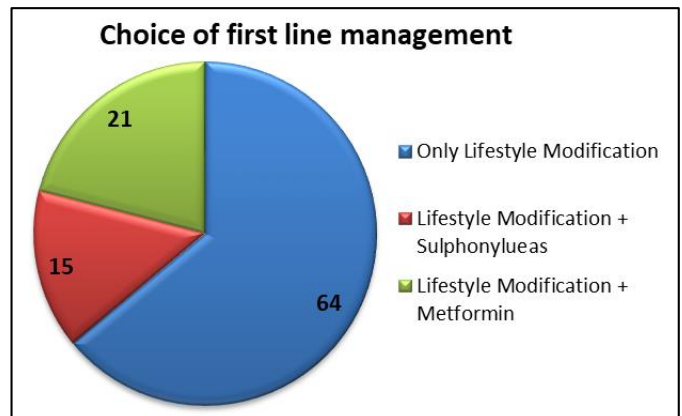
**Table 1:** Demographic parameters of practitioners included in the study

| Parameters                   |              | Values       |
|------------------------------|--------------|--------------|
| Age (in years)               |              | 36.08 ± 6.54 |
| Sex                          | Male         | 84 (84%)     |
|                              | Females      | 16 (16%)     |
| Medical education            | M.B.B.S      | 27 (27%)     |
|                              | M.D.         | 68 (68%)     |
|                              | D.M.         | 5 (5%)       |
| Duration of medical practice | < 2 years    | 12 (12%)     |
|                              | 2 – 5 years  | 24 (24%)     |
|                              | 5 – 10 years | 28 (28%)     |
|                              | > 10 years   | 36 (36%)     |

The practitioners surveyed had a mean age of 36.08 ± 6.54 years. 27% of the doctors were M.B.B.S. graduates, whereas 68% of the doctors were M.B.B.S. and M.D., and only 5% of the doctors have completed M.B.B.S, M.D., and D.M. in Endocrinology.

The most common age group of patients with diabetes mellitus treated by 69% of practitioners was between 46 years and 60 years. Also, 66% of the doctors said that there is a female prevalence of diabetes mellitus among the patients treated by them

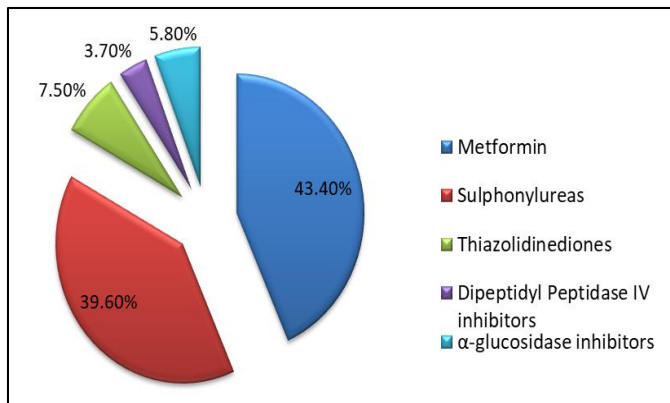
It was observed that 64% of the doctors preferred only lifestyle modifications as the first line of treatment. Lifestyle modifications included both diet management and regular physical exercise. Whereas, 36% of the doctors preferred a combined therapy of lifestyle modifications along with a single drug treatment. Among the 36% of the doctors who preferred a combined therapy, 58.33% of the doctors preferred metformin (biguanides) as the choice of antidiabetic drug for the first line of treatment.



**Fig 1:** Graph showing the preference of first line of management for newly diagnosed type 2 diabetic patients

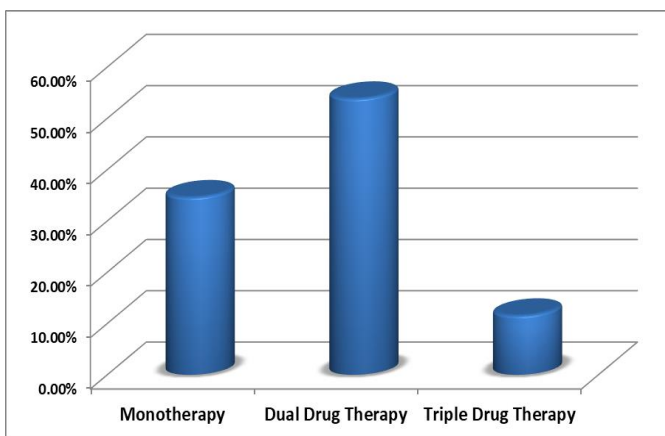
The most common oral antidiabetic drugs used by clinicians

interviewed were biguanides/metformin (43.4%), followed by sulphonylureas (39.6%), thiazolidinediones (7.5%),  $\alpha$ -glucosidase inhibitors (5.8%) and dipeptidyl peptidase iv (DPP-4) inhibitors (3.7%).



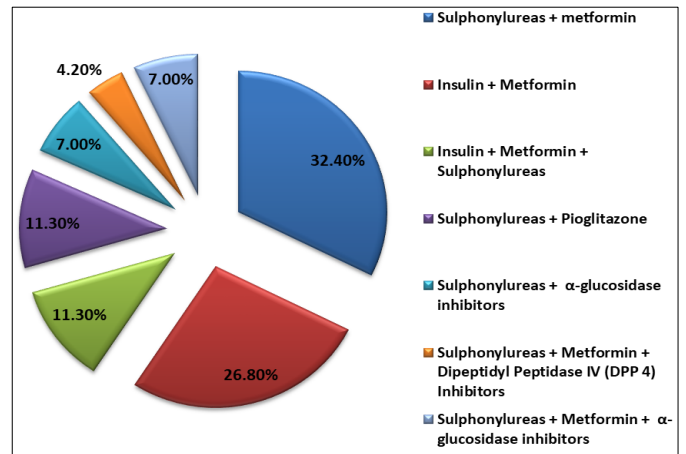
**Fig 2:** Graph showing the most preferred oral anti diabetic drugs by the clinicians

Clinicians most commonly prescribed a double therapy (53%) followed by monotherapy (34%) and finally a triple drug therapy (13%).



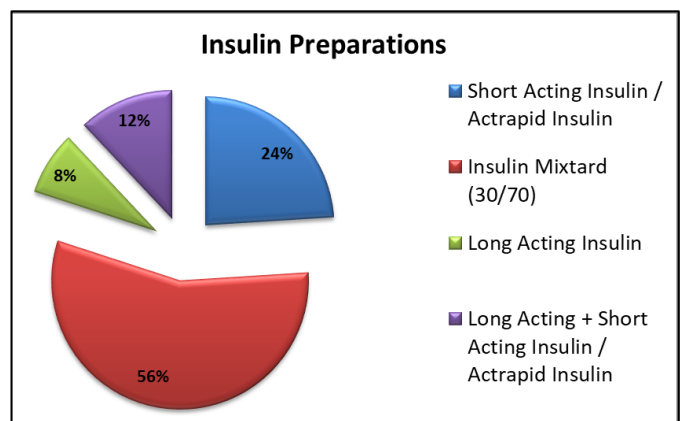
**Fig 3:** Graph showing difference in preference between single, double & triple drug therapy for antidiabetic drugs in type 2 diabetes mellitus patients.

The most frequently prescribed combination of antidiabetic drugs including injectables by the clinicians interviewed was a combination of metformin and sulphonylureas (32.4%), followed by metformin and insulin (26.8%), then a sulphonylureas and pioglitazone/thiazolidinediones (11.3%), a combination of metformin + sulphonylureas + insulin (11.3%), which was followed by sulphonylureas and  $\alpha$ -glucosidase inhibitors (7%) and a combination of sulphonylureas + metformin +  $\alpha$ -glucosidase inhibitors (7%) and least commonly a triple drug combination of sulphonylureas + metformin +  $\alpha$ -glucosidase inhibitors (4.2%).



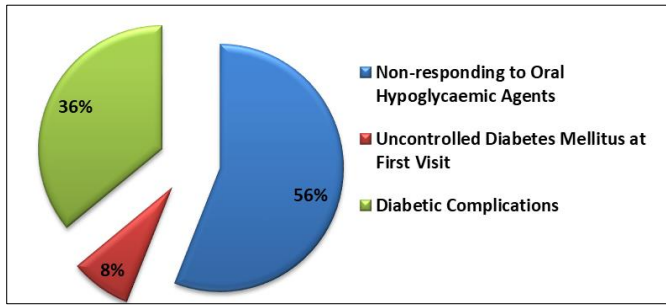
**Fig 4:** Graph showing the preference of different combinations of antidiabetic medications for the treatment of type 2 diabetes mellitus patients among clinicians treating in Pimpri, Maharashtra

The most commonly preferred insulin preparation by the practitioners/clinicians was insulin mixtard (30/70) by 56% of the practitioners. Insulin mixtard (30/70) is a combination of 30% soluble and 70% isophane insulin. It was followed by short acting insulin / Actrapid insulin by 24% of the practitioners, and long acting insulin by 8% of the practitioners and a combination of short acting insulin (Actrapid insulin) and a long acting insulin by 12% of the practitioners in Pimpri, Maharashtra.



**Fig 5:** Graph showing the preference of insulin preparations by the practitioners for treatment of type 2 diabetes mellitus patients.

The most common reason for switching to insulin preparations from oral antidiabetic drugs by the practitioners for treatment of type 2 diabetes mellitus patients was found to be patients who doesn't respond to the treatment of oral hypoglycaemic agents (OHAs), followed by diabetic complications like nephropathy, retinopathy, myocardial infarction, infections, stress, or other emergency co morbid conditions 96% of the doctors advised lifestyle modifications which include diet management, regular exercise, yoga etc. for their patients of type 2 diabetes mellitus.



**Fig 6:** Graph showing the common reasons for switching to insulin preparations

## Discussion

Out of 100 practitioners surveyed in this study, 84% of the practitioners were male whereas only 16% of them were females. The mean age of the practitioners surveyed was  $36.08 \pm 6.54$  years.

69 doctors said that the age group of patients most commonly treated by them were between 46 to 60 years of age. This reflected an association between diabetes mellitus with advanced age as reported previously [3] 66 practitioners said that there is female prevalence among the type 2 diabetes mellitus patients treated by them.

64% of the practitioners included in the study prefer only lifestyle modifications (which includes diet management, regular exercise etc.) as the first line of management of a newly diagnosed type 2 diabetes mellitus, whereas the other 36% preferred an aggressive treatment in newly diagnosed patients with an antidiabetic medication along with lifestyle modification. 58.33% of the practitioners preferred metformin over sulphonylureas as an anti-diabetic drug as first line, along with lifestyle modifications.

We found that overall metformin was the most commonly used antidiabetic agent. Even as monotherapy, metformin (43.4%) was found as a preferred antidiabetic drug than sulphonylureas (39.6%) or thiazolidinediones (7.5%),  $\alpha$ -glucosidase inhibitors (5.8%) or dipeptidyl peptidase IV (DPP-4) inhibitors (3.7%). Higher use of metformin was also reported by Vengurlekar *et al.* [4], Rajeshwari *et al.* [5], and Adibe *et al.* [6]. Although we would like to mention that these previous studies were conducted at a single tertiary hospital whereas we surveyed the preferences of the practitioners who practice independently in Pimpri city of Maharashtra.

We also found that the practitioners preferred double drug therapy (53%) over a monotherapy (34%) or a triple drug therapy (13%) for treatment of type 2 diabetes mellitus patients.

It was found that the most common reasons for switching to insulin preparations from oral anti diabetic drugs by the practitioners/clinicians for treatment of type 2 diabetes mellitus patients was found to be patients who doesn't respond to the treatment of oral hypoglycaemic agents (56%), diabetic complications (36%). As per the consensus statement from American diabetes association and the European association for the study of diabetes [7] it is suggested that intensive insulin therapy, addition of sulphonylureas or thiazolidinediones or upward titration of metformin dose can be tried in case of inadequate control with metformin alone.

It was found that the most commonly preferred insulin preparations by the practitioners/clinicians was insulin mixtard (30/70) (56%), short acting insulin/Actrapid insulin (24%), long acting insulin (8%) and a combination of short acting insulin (Actrapid insulin) with a long acting insulin

(12%).

None of the practitioners preferred prescribing any alternative therapy for treatment of glycaemic control for their patients of type 2 diabetes mellitus but 96% of the practitioners advised lifestyle modifications which include diet management, regular exercise, yoga etc. for their patients of type 2 diabetes mellitus.

Success of pharmacotherapy in diabetes mellitus depends heavily upon lifestyle modifications followed by patient. These include regular exercise, dietary restrictions and weight control [7, 8]. A study assessing prevalent myths about diabetes mellitus in north India [9] reported almost 80% of diabetes patients surveyed believed that lifestyle modification has role in management of diabetes mellitus. In our study almost all the practitioners said that they advise patients for lifestyle modification. Beneficial effects of lifestyle modifications in management of diabetes mellitus have been well documented [7, 8] These lifestyle modifications though are difficult to incorporate in usual lifestyle and sustaining them requires a great deal of effort and patience [7].

## Conclusion

Overall metformin was the most preferred prescribed antidiabetic agent followed by sulphonylureas, thiazolidinediones,  $\alpha$ -glucosidase inhibitors and dipeptidyl peptidase 4 inhibitors. Metformin + sulphonylureas is the most preferred combination therapy, followed by metformin + insulin. The most preferred insulin preparations are insulin mixtard (30/70), followed by short acting insulin/Actrapid insulin. Although, use of OHAs was much higher in comparison to insulin. The practitioners preferred a double drug therapy over monotherapy or a triple drug therapy for treatment of type 2 diabetes mellitus patients. There may be a bias between the doctors among the classes of drugs used not on the basis of efficacy but on the basis of individual preference for different reasons.

## Limitations

A comparison between the prescription patterns between the graduate, post graduate and super speciality practitioners can be undertaken, which might give an idea about different prescribing patterns.

**Sponsorship:** None

**Conflicts of Interest:** None

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