



## PREVALENCE AND PRESCRIBING TRENDS OF ANTI-DIABETIC DRUGS IN TYPE 2 DIABETES MELLITUS ACCORDING TO STANDARD TREATMENT GUIDELINES IN DIFFERENT HOSPITALS OF LAHORE

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### ABSTRACT

The objective of study was to identify the prevalence and prescribing trends of anti-diabetic drugs in type 2 diabetes mellitus according to standard treatment guidelines in different hospitals of Lahore. In this retrospective observational study, data was collected from prescriptions of ambulatory diabetic patients by different physicians practicing in different public sector hospitals of Lahore, from February 2016 to April 2016. For this purpose 100 prescriptions were evaluated from various hospitals of Lahore, Pakistan. Type 2 Diabetes Mellitus is more prevalent in 40-50years age group. Mono oral therapy which includes Metformin is more prescribed by physician as compared to any other groups of drugs. According to our study, standard guidelines were followed for biguanides which is first line therapy type 2 diabetes mellitus.

**Keywords:** Prescription trends, Anti diabetic drugs. Type 2 diabetes mellitus

### INTRODUCTION

Type 2 diabetes mellitus has reached epidemic proportions worldwide; it has been studied that more than 220 million people have the disease in 2010 (Grover *et al.*, 2014). A study Shows that there are 336 million people have diabetes mellitus and the number of diabetic patients would be 552 million by 2030 (Duran *et al.*, 2014). Diabetes mellitus Type 2 is a chronic metabolic disorder which results from defect in insulin action or insulin secretion. From last few decades the prevalence of type 2 diabetes mellitus has been increased and currently affects more than 336 million people worldwide (Zimmet *et al.*, 2001, Hsu *et al.*, 2015, Mohammadi *et al.*, 2015). Type 2 Diabetes mellitus is the most prevalent type of diabetes (~90%) and is associated with high morbidity and mortality (de Lusignan *et al.*, 2005, Junco and Slaga, 2012, Saeed *et al.*, 2018) and is characterized by fluctuating degrees

of resistance to the action of insulin with comparative insulin deficiency (Margolis *et al.*, 2013).

Diabetes mellitus is managed by both pharmacological and non-pharmacological ways. Pharmacological treatment includes oral hypoglycemic agents and subcutaneous agents (Alwan, 1994, Ugege *et al.*, 2015, Rubino, 2014, Ali *et al.*, 2017). Diabetes mellitus is diagnosed by a blood sugar tests either by fasting test (no food or fluid taken except water for eight hours) or a random test taken anytime during the day (2hr after a meal), or by Oral Glucose Tolerance Test or by HbA1C (every 2-3 months) (Margolis *et al.*, 2013). The criteria for diagnosis of diabetes mellitus is based on the values of fasting blood glucose test, random blood glucose test and HbA1C, which are  $\leq 126\text{mg/dl}$ ,  $\leq 200\text{mg/dl}$  and  $\leq 6.5\%$  respectively for normal healthy individuals (Association, 2013, Haas *et al.*, 2013, Shrivastava *et al.*, 2013, Springer *et al.*, 2013).

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Oral hypoglycemic agents include insulin sensitizers (Biguanides, Thiazolidinediones), secretagogues (Sulfonylureas, Glinides), DPP-IV inhibitors (Dipeptidyl peptidase-IV inhibitors), alpha glucosidaseinhibitors, and others (Rapid release bromocriptine). Subcutaneous agents are GLP-1 analogue (Exenatide, Liraglutide, Extended release exenatide), Incretin (Pramlintide), Insulin that includes Rapid-Acting (Aspart, Lispro, Glulisine), Short-Acting (Regular) Intermediate (Neutral Protamine Hagedorn), Long-Acting (glargine, detemir), Premixed (Humalog mix 50/50 and 75/25) and (Novomix 30, Novomix 50) (Van den Berghe *et al.*, 2006, Ng *et al.*, 2012, Song *et al.*, 2014, Schwartz and DeFronzo, 2014). Non-Pharmacological management includes dietary management, physical activity and stress management (Alwan, 1994). Self-monitoring of blood glucose (SMBG) by the patient, and frequent glycated protein assays is a major tool for the glucose monitoring (Saudek *et al.*, 2006, Malanda *et al.*, 2013, MacLeod *et al.*, 2013, Kang and Cho, 2016, Abdel-Aziz *et al.*, 2013). This study focuses on the trend of the prescribed anti-diabetics in the Lahore in order to find the prevalence according to the treatment guidelines.

## SUBJECTS AND METHODS:

### Study Design:

In this descriptive, retrospective and qualitative study, data was collected from prescriptions of ambulatory diabetic patients by different physicians practicing in different public sector hospitals of Lahore, from February 2016 to April 2016.

### Inclusion Criteria:

The patients diagnosed with Type 2 Diabetes Mellitus included in the study

### Exclusion Criteria:

The Type 1 Diabetes Mellitus patients and Type 2 Diabetes Mellitus patients which suffered from other diseases such as HTN and other co-morbidities i.e., peptic ulcer excluded from the study. Patients were randomly recruited in the study.

### Study Centre:

For this purpose 100 prescriptions were collected from various hospitals of Lahore, Pakistan. The patterns of drug used in OPD patients (Both Public and Private Hospitals) suffering from type 2 diabetes mellitus were studied.

### Study approval:

Ethical approval of the study was taken from University review board on human research as well as

administrations of all institutes. The reference number was (EC/QU/086/2016).

### Study Tool:

A questionnaire was designed on basis of pharmacological classes of drugs, which also includes the patient age and gender. This perform was designed according to the already set standards "Prevalence and anti-hyperglycemic prescribing trends for patients with type 2 diabetes in Italy" (Mazzaglia *et al.*, 2008, Monesi *et al.*, 2012, Rafaniello *et al.*, 2015).

### Methodology:

We arranged prescription data of anti-diabetic medications by therapeutic class which included oral anti-diabetic drugs and injectable anti-diabetic drugs. All the outpatients with type 2 diabetes mellitus were included in the study except inpatients, pregnant and lactating women. The independent variables in this study were name of patients and demographics. The dependent variables were age of patient, gender; pharmacological classes of anti-diabetics; drugs prescribed with generic name, and also prescriptions containing insulin.

### Data Analysis:

Data obtained were analyzed by using simple excel method. Results were analyzed descriptively in the form of percentages and presented in tabulation form. The various parameters were analyzed as per follow:

- Mono Oral Therapy to check prescribing trend of mono oral therapy
- Oral Combination Therapy to check prescribing trend of oral combination therapy
- Oral Therapy with insulin to check prescribing trend of oral therapy with insulin

## RESULTS

### Prevalence of prescription:

It concludes that drugs prescribed for Type 2 Diabetes Mellitus is 53% prevalent in Females and 47% in males from various public and private hospital of Lahore as shown in the figure 1. While it was more in 40-60 years age group than others as shown in the figure 2.

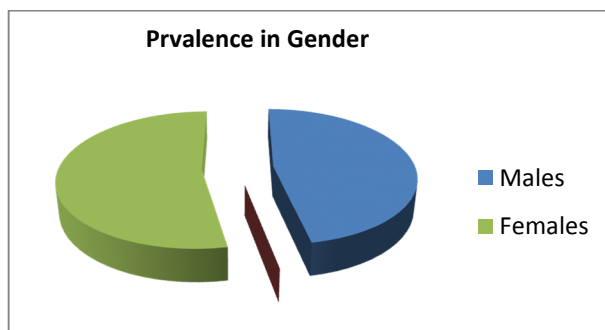


Figure 1: Chart shows the Male vs. Female (prevalence in gender) percentage of prescribing drugs in our study.

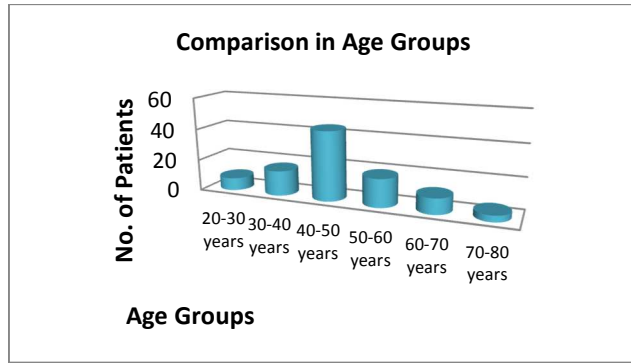


Figure 2: The bar chart shows that the Diabetes Mellitus Type 2 prevalence in different age groups.

There are many oral anti-diabetic agents have been prescribed but our study reveals that among the prescribed drugs for the type 2 Diabetes Mellitus the most prescribed drug is Bigunides 51% (mono oral therapy), Insuline 26%, Salfonylureas 11%, Gliptines 5%, Other drugs 5%, and oral combinations are least prescribed.

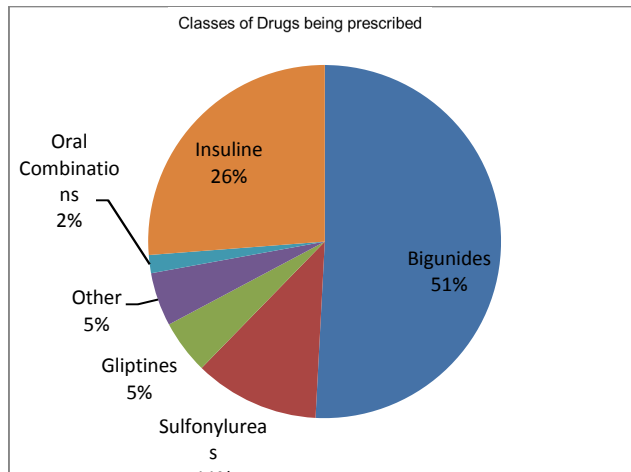


Figure 3: Percentantage of oral anti-diabetic drugs prescribed.

Our study indicates that from total 100 prescriptions 62 contains Bigunides (Metformin), 32 prescriptions contain Insulin, 14 prescription contain sulfonamides, 6 prescriptions contain Gliptines, 6 prescriptions contain drugs from other class, and 2 prescriptions contains oral combinations.

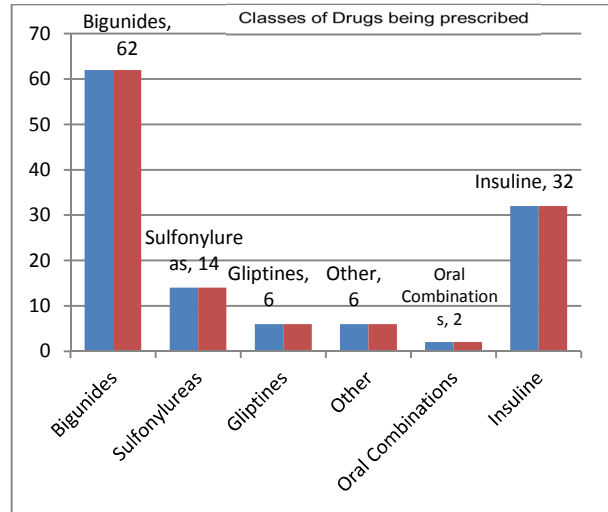


Figure 4: Classes of drugs being prescribed in Lahore.

Oral therapy vs. Oral therapy with insulin:

The results have shown that mono oral therapy which includes Biguanides (Metformin) is prescribed by physician 69% while the mono-oral therapy with insulin is prescribed 31% as in figure 5.

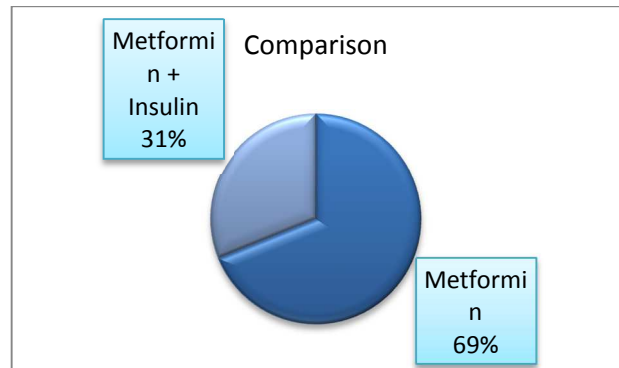


Figure 5: Comparison of oral and insulin therapy.

### DISCUSSION:

Type 2 Diabetes mellitus is a chronic metabolic disorder which results from defect in insulin action and insulin secretion. Type 2 diabetes mellitus has reached epidemic proportions worldwide; it has been studied that more than 220 million people have the disease in 2010 (Alberti et al., 2005). A study Shows that there are 336 million people have diabetes mellitus and the number of diabetic patients would be 552 million by 2030 (Duran et al., 2014). According to international diabetic federation (IDF) Diabetes can be diagnosed on any of the following World Health Organization (WHO) criteria; Fasting plasma glucose (FPG)  $\geq 7.0$  mmol/l (126 mg/dl) or, 75 g oral glucose tolerance test (OGTT) with FPG  $\geq 7.0$  mmol/l (126 mg/dl) and/or 2 hour plasma glucose  $\geq 11.1$  mmol/l (200 mg/dl) or, glycated

hemoglobin(HbA1c)  $\geq 6.5\%$  / 48 mmol/ mol, or Random plasma glucose  $\geq 11.1$  mmol/l (200 mg/dl) in the presence of classical diabetes symptoms, Asymptomatic individuals with a single abnormal test should have the test repeated to confirm the diagnosis unless the result is unequivocally elevated. Where a random plasma glucose level  $\geq 5.6$  mmol/l ( $\geq 100$  mg/dl) and  $< 11.1$  mmol/l ( $< 200$  mg/dl) is detected, a FPG should be measured, or an OGTT performed, or an HbA1c measured. According to IDF guidelines biguanides are used as 1<sup>st</sup> line agents in type 2 diabetes when glucose control targets are not being achieved, add a sulfonylurea. If Metformin is not used first-line, add a-glucosidase inhibitor, a dipeptidyl peptidase4 (DPP-4) inhibitor or thiazolidinedione. A rapid-acting insulin secretagogue is an alternative option to sulfonylureas. A study in Italy indicate an increasing prevalence of type 2 diabetes throughout the years 2000–2003. When mono-therapy is used then sulfonylurea used is decreased from 2000-2003 while use of biguanides are increased. During the same period, the use of sulfonylurea mono-therapy, oral combination therapy and insulin with oral combination therapy decreased. The results from them ultivariate analysis revealed that healthier patients were more likely to be prescribed biguanide or sulfonylureas mono-therapy.

The analysis in the current study also found that the prevalence rate of type 2 diabetes was higher in men than in women. The females in their study tended to be older than the males and had a higher rate of hypertension and obesity. This is consistent with results in a recent study, which found a higher prevalence of metabolic syndrome in older women compared to men. During our study 100 prescriptions were examined. All the prescriptions are collected from Public and private hospitals of Lahore. Prescription are observed and analyzed as per exclusion and inclusion criteria. Data is extracted and collected according to the parameters of study. According to clinical characteristics and demographics, females were more prone to diabetes mellitus in our study as compared to male patients as shown in Figure 1. Type 2 Diabetes Mellitus is more prevalent to 40-50years age group as shown in Figure 2. Mono oral therapy which includes Metformin is more prescribed by physician as compared to other groups of drugs as shown in Figure 5.

#### CONCLUSION:

It is concluded that IDF guidelines which were used to compare the result of studies followed in the different hospitals of Lahore, as the biguanides were most prescribing drugs in case of Type 2 diabetes mellitus.

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