

Research Article

Prescription Analysis of Ambulatory Patients of Diabetes Mellitus in Lahore Pakistan

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ABSTRACT

Diabetes mellitus is one of the leading causes of mortality and morbidity worldwide. Its incidence rate appears to be increasing in the last few decades. In this study prescribing pattern of medications in 100 ambulatory patients of diabetes mellitus was observed from September 2013 to December 2013 in Lahore. It was revealed from our study that diabetes mellitus was more prevalent in patients of age above 30 years (96%) & incidence rate was higher in females (61%) as compared to males. 72% prescriptions were legible, dose was missing in 26% of the prescription, frequency in 38% and strength of medicines in 27%. Either of insulin or oral hypoglycemic agent was prescribed in 46% of the prescriptions as monotherapy. Biguanides were the most prescribed oral hypoglycemic agents as monotherapy (33%) & insulin alone in 13% patients. Combination of antidiabetic agents was observed in 54% prescriptions and frequently prescribed combination was of Sulfonylureas with Biguanides (41%).

Key Words: Insulin, Diabetes mellitus, Oral hypoglycemics, Prescribing trends, Sulfonylureas, Biguanides

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INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by abnormal carbohydrate metabolism that leads to the hyperglycemia. It is related with a comparative or absolute deficiency of insulin secretion or resistance to the action of insulin (Ogedengbe OS, 2009). It has been increasing in prevalence since last decades and currently affects more than 170 million people worldwide (Patel H et al, 2006). In Pakistan its prevalence is high ranging from 7.6 to 11% (Hakeem R, Fawwad A 2010). Type 1 diabetes or juvenile-onset diabetes is categorized by an absolute deficiency of insulin due to autoimmune-mediated destruction of the pancreatic beta cells that are responsible for the production of insulin (Cuthbertson D, 2008). Type 2 Diabetes or maturity-onset diabetes is the most prevalent type of diabetes (-90%) and is associated with high morbidity and mortality (Lusignan S et al., 2005) and is characterized by fluctuating degrees of resistance to the action of insulin with comparative insulin deficiency (Sperl-Hillen J 2012). Type 3 Diabetes or Brain diabetes having known reasons that brain instantaneously needs glucose. It can occur due to infections, sepsis hormonal changes, drugs and stress. It is also the cause of Alzheimer's disease (Steen E et al., 2005). In Type 4 diabetes or gestational diabetes, body is under metabolic and physiological stress because the fetus consumption of glucose increases. In the patients with Type 4 diabetes, indication for insulin therapy is ineffective but exercise and nutritional therapy affects the prandial and fasting blood glucose levels (Mwanri W A et al., 2014).

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) (Sperl-Hillen J 2012). 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 (American Diabetes Association. Diabetes care, 2013).

Diabetes mellitus is managed by pharmacological and non-pharmacological ways. Pharmacological treatment includes oral hypoglycemic agents and subcutaneous agents (Alwan AAS, 1994). Oral hypoglycemic agents include insulin sensitizers (Biguanides, Thiazolidinediones), secretagogues (Sulfonylureas, Glinides), alpha glucosidaseinhibitors, DPP-IV inhibitors (Dipeptidyl peptidase-IV inhibitors), 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 (NovoLog mix 70/30) (Lub R et al., 2006).

Non-Pharmacological management includes dietary management, physical activity and stress management (Alwan AAS, 1994). Dietary Management includes chunks of food including cereals, mixed coarse grains, whole pulses, salads, red rice, fruits and vegetables (low GI), brown bread, dietary fibers (oats, pulses), proteins and Saturated fat (ghee, butter). Sugar, honey, jaggery, sweets, white rice, white bread (high GI), hydrogenated fat must be avoided (Diabetes Management in General Practice, Guidelines for type 2 diabetes, 2012). Dietary cholesterol intake should be

<300mg/day. Physical Activities include regular exercise which is essential; brisk walk 30min/day & 150min/week. As the exercise leading to the benefits which are ; improvement in insulin sensitivity, weight management, improvement of lipid profile, improvement of the function of CVS, increase in bone density, improvement of the quality of life, mental and physical wellness (Alwan AAS, 1994). Stress management includes behavioral modification (Positive thinking), meditation, appropriate support and counseling; improve skills (reading, writing, poetry) (Phan H et al., 2012). Study of prescribing practice, health facility or aggregate data indicators may indicate that there is over or under-consumption of medicines and these qualitative studies may indicate the reason that why certain health staff and patients behave the way they do. However, such studies do not give details about the exact nature of irrational use of medicines (Subhasish S et al., 2010).

The purpose of study was to evaluate the prescription patterns of anti-diabetics using WHO prescribing indicators (Khan AA et al., 2013; Angamo MT et al., 2011 ; Mahallie AAE , 2012). Prescriptions were analyzed after grouping the anti-diabetic medications by their respective therapeutic classes: sensitizers, secretagogues, alpha glucosidase inhibitors, DPPIV inhibitors, GLPI analogue, Incretin and Insulin. Study parameters for ambulatory diabetic patients included WHO core and complementary indicators; which were, average number of anti-diabetic drugs per prescription, percentage of drugs prescribed by generic name (Duerden M et al., 2011), percentage of prescriptions with an insulin prescribed, percentage of prescriptions with dose mentioned, percentage of prescriptions with legible handwriting, percentage of prescriptions with dose frequency and strength of drug mentioned in it.(Alwan AAS, 1994 ; Khan AA et al., 2013; Angamo MT et al., 2011). The most common preference as drug of choice in a community; either oral hypoglycemic agents or insulin was also evaluated. Prescribing errors have the potential to cause serious side effects in diabetic patients. Poor hand writing, improper communication and

the use of inappropriate abbreviations are also amongst the major prescribing errors (Khan AA et al., 2013).

MATERIAL AND METHOD

In this descriptive, qualitative, cross sectional study, data were collected from prescriptions of ambulatory diabetic patients by general practitioner's (GP's) practicing in different clinics of Lahore, from September 2013 to December 2013. For this purpose 100 prescriptions were collected from various areas of Lahore. A questionnaire was designed by using WHO core and complementary indicators. The Prescribing indicators of WHO used for this study included, average number of drugs per prescription, percentage of drugs prescribed with generic names, and percentage of encounters with legible hand writing (Khan AA et al.,2013; Angamo MT et al., 2011). All the outpatients with diabetes mellitus either with type 1 or type 2 were included in the study except inpatient, pregnant and lactating women. The independent variables in this study were age and gender of the patient. The dependent variables were average number of anti-diabetics; percentage of drugs prescribed with generic name, legible handwriting, prescriptions containing insulin and mentioned dose, frequency and strength of drug (Carey N et al., 2008; Angamo MT et al., 2011). We grouped prescription data of anti-diabetic medications by therapeutic class which included oral anti-diabetic drugs and injectable anti-diabetic drugs. Data obtained were analyzed by using SPSS version 16.0 statistical software programs. Results were analyzed descriptively in the form of percentages and presented in tabulation form according to the tool types (Alexander CG et al., 2008).

RESULTS

The age of majority of patients in study was observed to be above 30 years (n=96) as shown in Figure 1.

According to clinical characteristics and demographics, females were observed more prone to diabetes mellitus in our study (n=61) as compared to male patients as shown in Figure 2.

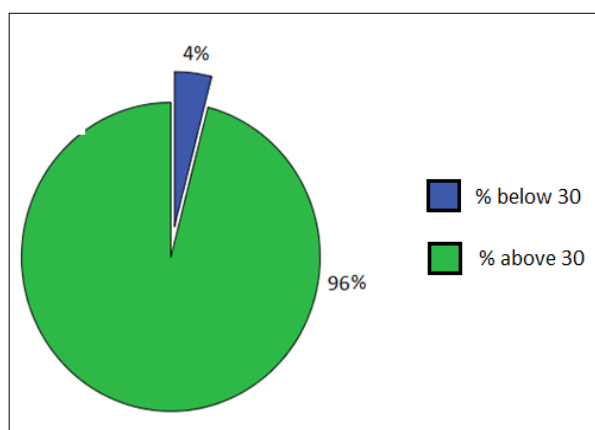


Figure 1: Percent distribution of diabetic patients on the basis of age above and below 30 years

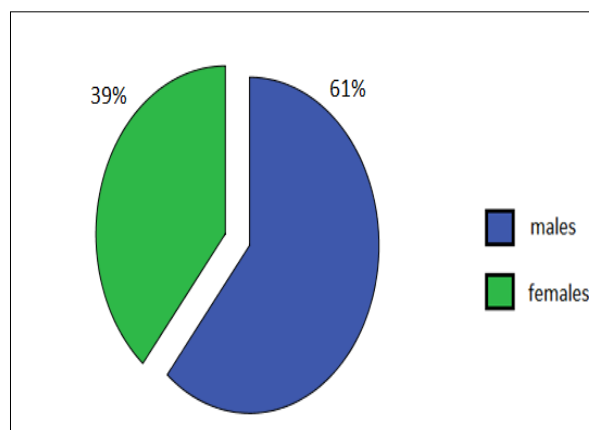


Figure 2: Gender wise percentage distribution of patients with diabetes mellitus

Average number of drugs (anti diabetic and non anti diabetic) prescribed per prescription was 3.5 whereas antidiabetic drugs per prescription were 1.5 as shown in

Figure 4. 48% prescriptions contained 3 or less drugs per prescription, 38% prescriptions contained 4 or 5 drugs per

Figure 3: Frequency distribution of prescriptions with no. of drugs

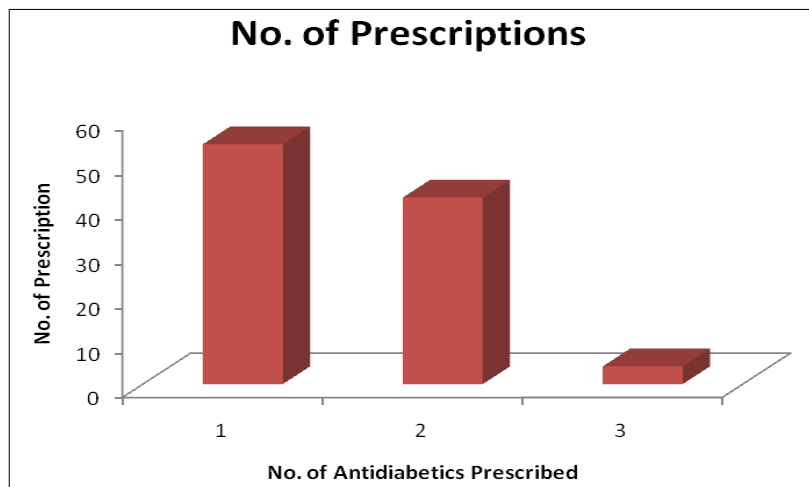
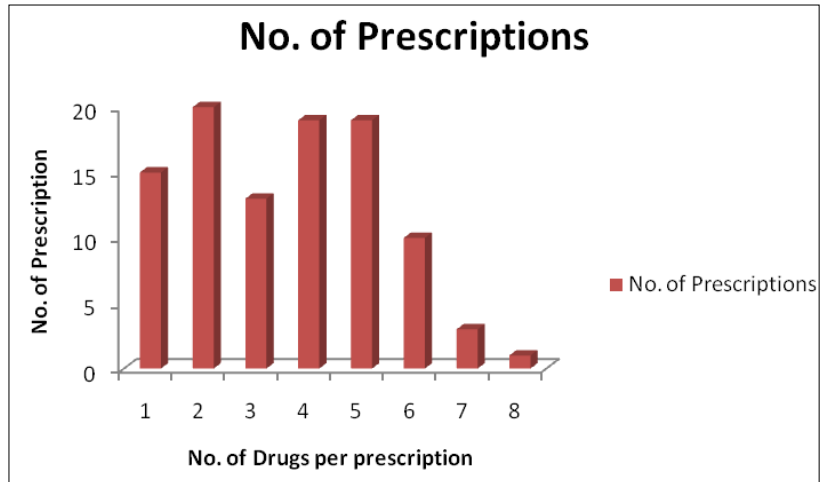
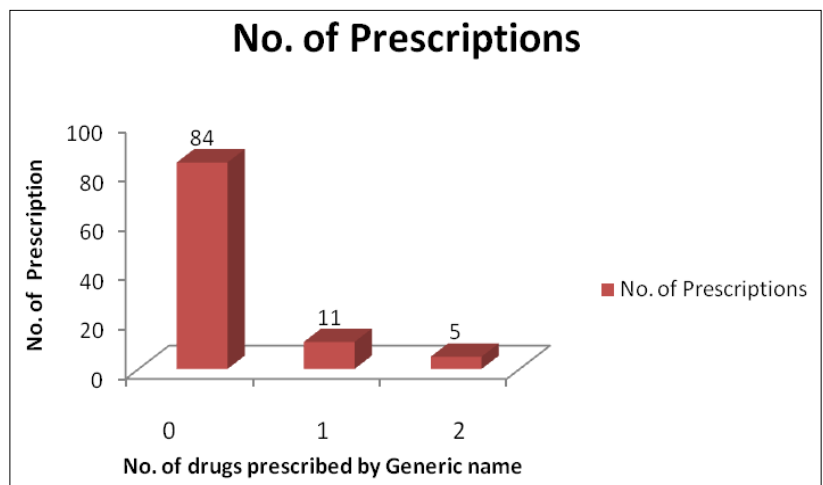


Figure 4: Frequency distribution of anti-diabetic agents per prescription

Figure 5: Frequency distribution of prescriptions containing drugs prescribed by generic name



prescription and 14 % prescriptions contained more than 5 drugs per prescription as shown in Figure 3.

Generic name of the medicines was mentioned in only 16% prescriptions (11% of antidiabetics and 5% other drugs) as shown in Figure 5 and in 28% prescriptions handwriting was illegible. Dose was missing in 26% of the prescription,

frequency in 38% and strength of medicines in 27% of prescriptions. Either insulin or oral hypoglycemic agent was prescribed in 54% of the prescriptions. Biguanides were the most prescribed oral hypoglycemics as monotherapy (33%) as shown in Table. No. 2 & insulin alone in 13%, out of which 10% prescriptions contained premixed insulin, 2%

short acting insulin and 1% intermediate acting insulin. Combination of antidiabetic agents was observed in 46% prescriptions. Combination of oral anti diabetic agents was observed in 43% prescriptions. Frequently prescribed combination was of Sulfonylureas with Biguanides (41%) and combination of three oral anti-diabetic drugs (biguanides + sulphonylureas + thiazolidinediones) was observed in 2 % prescriptions. Combination of various types

of insulin with oral anti diabetic agents was observed in 3% of prescriptions. 1% prescriptions contained combination of premix insulin and diasaccharidase inhibitor, 1% prescription with combination of premix insulin and two oral anti-diabetics (biguanides + sulphonylureas). Combination of oral anti-diabetic drugs (biguanides) and pre mixed insulin was least frequently prescribed (1 %) as shown in Table 1 and Figure 6.

Table 1: Percentage distribution of anti diabetic agents according to therapeutic class in prescriptions

Therapeutic Class	Percentage
Biguanides	33
Sulphonylureas	8
Biguanides and Sulphonylureas (combination)	41
Short acting insulin	2
Inter mediate acting insulin	1
Premixed insulin	10
Premix insulin and Diasaccharidase inhibitor (combination)	1
Premix insulin and oral anti-diabetics (biguanides+sulphonylureas)	1
Combination of oral anti-diabetic drugs (biguanides+sulphonylureas+thiazolidines)	2
Combination of Biguanides and Pre mixed insulin	1

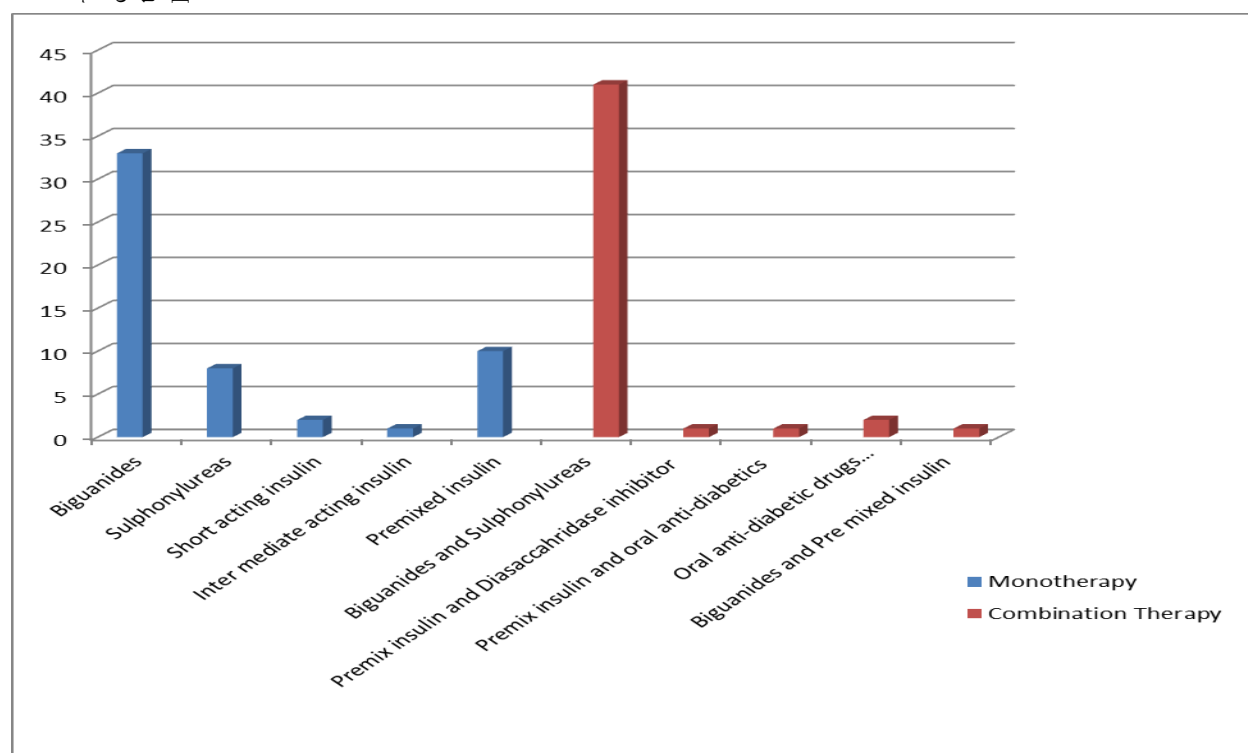


Figure 6: Percentage distribution of antidiabetics therapeutic class wise

DISCUSSION

Based on the prescription analysis data, 100 prescriptions of diabetic patients selected randomly from various areas of Lahore were analyzed. In this study, the high prevalence (96%) of diabetes was observed in patients above 30 years as shown in Figure 1. A study conducted at U.S. and UK showed the similar result (Phan H et.al,2012) In our study the rate of occurrence of diabetes in females was greater (61%) than that of males (39%) as shown in Figure 2. WHO core and complementary indicators were used in this study to analyze the prescribing trends in ambulatory diabetic patients. According to WHO, average number of drugs per

prescription should be 1.6 – 1.8 (Desalegn AA 2013), in our study average number of drugs per prescription was 3.5, which is almost double to the WHO standard (Figure 3). Average number of anti diabetic agents was observed to be 1.5 (Figure 4), same trend was observed in similar studies conducted at Karachi, Pakistan and Southwest Ethiopia (Khan AA et al., 2013; Angamo MT et al., 2011). It was observed that only 16 % drugs were prescribed by generic name (Figure 5) which is very low as compared to WHO standard which is 100% (Desalegn AA 2013). Mono therapy was observed in 46% of prescriptions and combination therapy in 54% (Figure 6). Biguanides were the most

frequently prescribed agents (33%) as monotherapy (as represented by A in fig.6). A similar trend of biguanides prescribing was also observed in a study performed in UK (Fillion KB et al., 2009). A similar study conducted in Italy and Manitoba in which the prescribing percentage of biguanides was also high (Mazzaglia G et al., 2008 ; Ludwig SM et al., 2006). Mostly prescribed insulin as mono therapy (10%) was premixed insulin followed by short acting insulin (2%) and intermediate acting insulin (1%) as represented in Figure 6.

Combination of biguanides and sulphonylureas was mostly prescribed (41%) as shown in Figure 6. A study conducted in US in 2008, showed similar higher proportion of same combination of oral anti diabetic agents (Alexander CG et al., 2008). Combination of three oral anti diabetic drugs (biguanides + sulphonylureas + thiazolidindiones) was observed in 2% prescriptions (Figure 6). A combination of oral anti-diabetic drugs (biguanides) and pre mixed insulin was prescribed on 1% prescriptions (Figure 6). Another similar study conducted at Italy in which the same results were obtained (Mazzaglia G et al., 2008). Combination of premixed insulin and diacyclic acidase inhibitors was in 1% (Figure 6.) and combination of premix insulin and oral anti-diabetic drugs (biguanides+ sulphonylureas) in 1% (Figure 6).

Biguanides were the most prescribed oral hypoglycemic agents alone and in combination with sulphonylureas. Poor prescribing practices were observed as for as generic prescribing and average number of drugs were concerned. This study appears to suggest that prescribing practices should be in line with the recent scientific evidences. There is a need to develop Diabetes mellitus management guidelines and Continual Education (CE) programs on Good Prescribing Practices for family physicians in order to meet the WHO standards for prescribing practices.

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