

Prescribing Pattern of Anti-Diabetic Drugs for Type 2 Diabetic Patients in a Tertiary Care Hospital

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Abstract

Introduction: Diabetes mellitus (DM), particularly Type 2 DM is now recognized as a major chronic public health problem throughout the world. Different anti-diabetic agents, oral or injectable are used to regulate patients' glycemic status as monotherapy or in combination.

Objectives: To observe the prescribing pattern of anti-diabetic agents and to collect demographic and disease details of type 2 DM patients.

Materials and Methods: This descriptive cross-sectional study was conducted from January to August 2017 in the outpatient department of Border Guard Hospital, Pilkhana; a tertiary level hospital in Dhaka. The study enrolled 172 type 2 diabetic patients purposively on specified criteria. Demographic data, drug prescribing pattern, disease pattern were collected by an interview and from patients' prescriptions.

Results: Among 172 respondents, 70 (40.70%) were male and 102 (59.30%) were female. The mean age of patients was 54.21 ± 10.09 years. Eighty seven (50.58%) patients were either overweight or obese. Eighty two (47.67%) patients had family history of DM. Majority of patients (84.89%) had duration of diabetes >5 years and 84 (48.84%) patients had co-morbidities. Majority of the patients 135 (78.49%) were prescribed oral drugs either alone or in combination. Among them 83 (63.48%) patients were prescribed oral monotherapy and 52 (38.52%) patients were prescribed oral combination therapy. Metformin was the most prescribed oral anti-diabetic drug as monotherapy (71.08%). Among combined anti-diabetic drugs based on class, metformin+Dipeptidyl peptidase 4 inhibitors (DPP4i) (36.11%), combination was the most commonly prescribed combination. The findings can lead to select the formulation and combination of anti-diabetic drugs in this part of the world for developing & marketing a new anti-diabetic drug.

Conclusion: Metformin was the most commonly prescribed drug both as monotherapy as well as combination therapy and monotherapy was predominant over combination therapy.

Key-words: Prescribing pattern, Anti-diabetic drugs, Type 2 DM, Tertiary care hospital.

Introduction

Diabetes mellitus (DM) is defined as chronic hyperglycemia resulting from either decreased insulin secretion, impaired insulin action or both. Type 2 DM results from the body's ineffective use of insulin. It accounts for approximately 90% to 95% of all diagnosed cases of diabetes. DM, particularly type 2 DM is now recognized as a major chronic public health problem throughout the world. Prevalence of diabetes has increased rapidly over the past few decades. In 2014, 422 million people in the world had diabetes, corresponding to a prevalence of 8.5 % among the adult population. According to International Diabetes Federation (IDF), Bangladesh is in 10th position among all countries in the world in 2015 by the number of 7.1 million adults which is set to increase by 91.6 % (13.6 millions) in less than 25 years¹.

Although extensive resources have been invested to control DM in several developed and developing countries, the management and outcome remain inadequate and Bangladesh as a developing country is not an exception. There is limited data regarding drug use pattern in diabetic patients in Bangladesh. Study related to drug utilization is very important to promote rational drug use. Moreover, irrational prescribing can lead to increased cost of drugs, which often leads to non-adherence². Despite the existence of evidence-based prescribing guidelines, the patterns of drug prescribing are often inappropriate. Studies have suggested the need for evaluation of these patterns in an effort to improve prescribing standards³. So this study was conducted to observe the prescribing pattern of anti-diabetic agents among outpatients of type 2 DM in a tertiary hospital in Dhaka, Bangladesh.

Materials and Methods

This descriptive cross-sectional study was carried out over 8 months (January to August 2017). The study included 172 type 2 DM patients attending the outpatient department of a tertiary hospital, Bangladesh Border Guard (BGB) hospital, Pilkhana in Dhaka. The patients who were aged between 30 years to 80 years, in optimal mental condition, receiving their medication for at least

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6 months from outpatient department, BGB hospital and willing to attend the study were selected for this study. Type 1 DM patients, Gestational diabetic patients, polycystic ovary syndrome (PCOS), disoriented patients and patients who declined to participate were excluded from the study. After getting informed verbal consent from the patients, an interview was conducted by a pre-tested semi-structured case record form. Demographic data such as age, gender, health related data like BMI, co-morbidities etc. as well as data on prescription were collected with this case record form. Data were analyzed using Microsoft Excel 2010.

Results

Among the total 172 respondents, 70 (40.70%) were male and 102 (59.30%) female with male: female ratio of 0.69:1. The mean age of the subjects was 54.21±10.09 years with a minimum and maximum age of 34 and 74 years respectively. Most of the respondents were in the age group of 50 – 59 years (37.79 %). BMI (kg/m²) of the most respondents (49.42%) were within normal range of BMI (kg/m²). Most of the respondents passed higher school certificate (HSC) examination (44.77%). Majority of the respondents were housewives (52.33%) followed by retired BGB person (29.65%), school teachers (5.82%), junior commissioned officers (4.07%) and others respectively. Total 156(90.70%) respondents were married. Eighty two (47.67%) patients had positive family history and most of the patients (48.84%) had duration of disease more than 10 years (Table-I). Majority of diabetic patients(78.49%) were prescribed oral drugs followed by both oral and parenteral 20(11.63%) and only parenteral 17(9.88%) (Figure-1). Percentage of prescribed oral anti-diabetic drugs as monotherapy was higher than combination therapy. Among 135 patients 83 (61.48%) diabetic patients were prescribed monotherapy and 52(38.52%) diabetic patients were prescribed combination therapy (Figure-2). Fifty nine (71.08%) diabetic patients were prescribed Metformin followed by Sulphonyl Urea (SU) (15.66%) (Table-II). Most prescribed oral combined therapy was Metformin + Sitagliptin (50%) (Table-III). Furthermore Metformin + Dipeptidyl peptidase 4 inhibitors (DPP4i) combination was most commonly prescribed antidiabetic drugs based on class (36.11%) (Table-IV). Most of the respondents received short acting insulin 13(76.47%) as only parenteral therapy followed by intermediate acting insulin 2(11.76%) and mixed insulin 2(11.76%)(Fig-3). About 84 (48.84%) diabetic patients were with comorbidities and hypertension alone was the commonest 38(45.24%) (Table-V).

Table-I: Distribution of patients by demographic and health characteristics (n=172)

Characteristics	Number	Percentage
Age(in years)		
30-39	18	10.47
40-49	30	17.44
50-59	65	37.79
60-69	49	28.49
≥70	10	5.81
Gender		
Male	70	40.94
Female	102	59.06
BMI		
Normal range	85	49.42
Overweight	73	42.44
Obese	14	8.14
Family history		
Positive Family history	82	47.67
Negative Family history	68	39.53
Did not know	22	12.80
Marital status		
Married	156	90.70
Others (single, divorcee, widow or widowed)	16	9.30
Duration of type2 DM		
<5 years	26	36.11
5-10 years	62	36.05
>10 years	84	48.84
Level of education		
10th and below	10	5.81
SSC	35	20.35
HSC	77	44.77
Graduate and above	50	29.07
Employment status		
Housewife	90	52.33
School teacher	10	5.82
Nurse	2	1.16
Sipahi	2	1.16
Noncommissioned officer	5	2.91
Junior commissioned officer	7	4.07
Retired BGB person	51	29.65

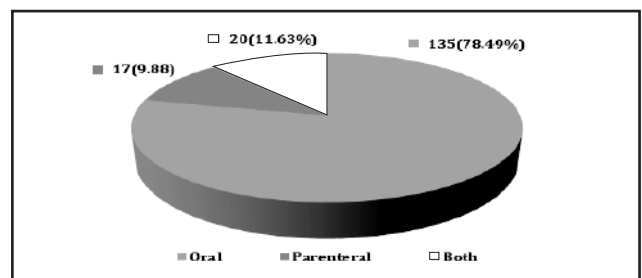


Figure-1: Distribution of patients by dosage formulations of anti-diabetic drugs (n=172)

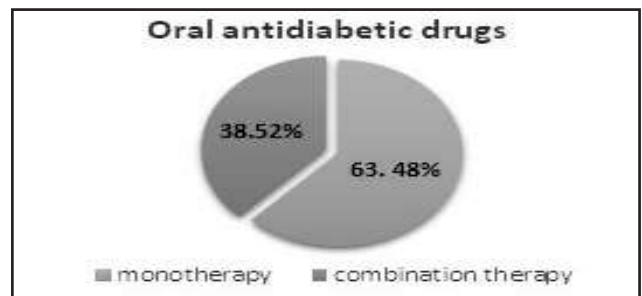


Figure-2: Distribution of oral anti-diabetic agents as monotherapy and combination therapy (n=135)

Table-II: Prescribing pattern of oral anti-diabetic drugs as monotherapy (n=83)

Class of drugs	Drugs	Number	Percentage
Biguanide	Metformin	59	71.08
Sulphonylurea	Glimeperide	7	8.43
	Gliclazide	6	7.23
Dipeptidyl peptidase 4 inhibitors	Sitagliptin	10	12.05
α glucosidase inhibitor	Acarbose	1	1.21
Total		83	100

Table-III: Prescribing pattern of oral anti-diabetic drugs based on combination therapy (n=52)

Two drug combination therapy	Number	Percentage
Metformin + Glimepiride	16	30.77
Metformin + Glibenclamide	4	7.69
Metformin + Glipizide	5	9.62
Metformin + Sitagliptin	26	50
Metformin + Pioglitazone	1	1.92
Total	52	100

Table-IV: Distribution of the combined anti-diabetic drugs prescribed (n=30)

Combined drug	Number	Percentage
Metformin + DPP4i (sitagliptin)	26	36.11
Metformin + glitazone	1	1.39
Metformin + SUs	25	34.72
Metformin+ insulin	20	27.78
Total	72	100

DPP4i=Dipeptidyl peptidase 4 inhibitor

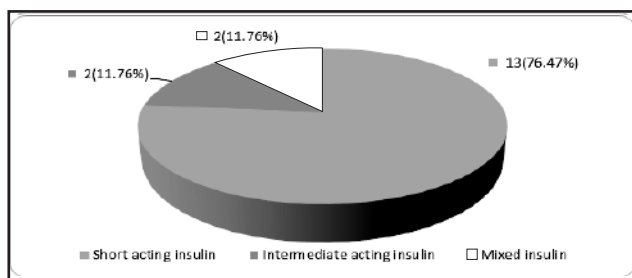


Figure-3: Distribution of different preparations of insulin prescribed as monotherapy (n=17)

Table-V: Distribution of co-morbidities associated with type-2 DM (n=84)

Co-morbidity	Number	Percentage
BEP	3	3.57
Cataract	4	4.76
Cataract and hypertension	5	5.96
CKD	2	2.38
COPD	5	5.96
Hypertension	38	45.24
Hypertension with stroke	4	4.76
Hypertension with IHD	7	8.33
Hypertension, obesity	6	7.14
Hypothyroidism	2	2.38
Low back pain	6	7.14
Peptic ulcer disease	2	2.38
Total	84	100

BEP=Benign enlargement of prostate; CKD: Chronic kidney disease; COPD: Chronic obstructive pulmonary disease, IHD: Ischemic heart disease.

Discussion

This study analyzed the prescribing pattern in type 2 diabetic patients who visited outpatient department of BGB Hospital, Pilkhana. Out of 172 patients, females predominated in the study population which is comparable to results of the studies done in Bangladesh and Taiwan^{3,4}. Similar studies in India, neither male nor female preponderance was observed^{5,6}. This result is dissimilar with the findings of a cohort study observed in the United States. which reported a male preponderance for DM⁷. The mean age of the patients was 54.21(SD±10.09) years with a range between 34 and 74 years. This result was higher than the mean age in a population based study observed by Rahman et al in Bangladesh, (51.4 years)⁸. On the other hand, it was lower to the studies done in India (59.6±9.6 years)⁹, Nepal (56.9±12.6 years)¹⁰, Hong Kong (56.5±12.6 years)¹¹ and Spain (60.5±12.8 years)¹².

The study showed a higher prevalence of diabetes among elderly patients with a highest prevalence in the age group of 50–59 years (37.79%). Upadhyay et al¹⁰ and Venkateswaramurthy et al¹³ from their studies reported higher prevalence of diabetes in elderly patients with a highest prevalence in age group 41-60 years. Greater prevalence in this age group may be due to lack of physical exercise and stressful life condition¹⁴. In the present study, 50.58% type-2 diabetic patients were either overweight or obese. Overweight and obese are common health conditions which are increasing globally. Excess weight is associated with an increased incidence of type 2 DM¹⁵. Several studies in Bangladesh also revealed that, weight gain has a significant association with type-2 diabetes among Bangladeshi populations¹⁶⁻¹⁸.

This study showed 82 patients (47.67%) had family history of diabetes which was comparable with the studies done by Venkateswaramurthy et al¹³, John et al¹⁹ and Ramesh et al²⁰. Duration of the disease plays an important role in management of diabetes. A firm glycemic control results in lesser occurrence of complications but complications like retinopathy was related to duration of diabetes but not based on its severity. In this study, majority of patients (84.89%) had diabetic duration of > 5yrs. Similar findings were reported by Upadhyay et al¹⁰ and Venkateswaramurthy et al¹³. In contrast, study observed by Ahmed et al showed majority (54%) has diabetic duration for less than 5 years³.

Majority of type 2 DM patients (90.12%) in this study were prescribed oral drugs either alone (78.49%) or in combination (11.63%). Oral dosage forms can definitely play an important role in improving patient adherence to

treatment. Metformin alone is most prescribed oral anti-diabetic drugs as monotherapy. Unlike sulfonylureas, thiazolidinediones, and insulin, metformin is weight friendly, which makes it a rational choice for obese patients. Furthermore, the management of Type 2 DM can be complicated by hypoglycaemia. Metformin has advantages over insulin and some types of insulin secretagogues; because it rarely causes significant hypoglycemia when used as a monotherapy. As a result, metformin is widely considered an ideal first-line agent for the treatment of Type-2 diabetes. In addition, the cost of metformin is very low, thus making it affordable by the patients in developing countries like Bangladesh. Metformin was found to be the highest prescribed drugs in similar studies^{10,21,22}.

Among the sulfonylureas, glimepiride was the most frequently prescribed (10.84%) followed by gliclazide (4.82%) as monotherapy. Glimepiride is administered as a single daily dose because of its long half-life which improves patient's compliance. It is converted into inactive metabolites by liver which lowers the incidence of hypoglycaemia. Furthermore, there are studies indicating that the blood glucose lowering effect of glimepiride was not significantly different from metformin. So, it can be considered as a good choice for monotherapy secondary to metformin²³.

As diabetes progresses, functional decline in beta cells is usually apparent and the need for combination therapy is unavoidable. Therefore, combination modalities have become an integral part of diabetes management. The basic rationale for combination therapy is to provide additive effects with different mechanisms of action and to allow lower doses for disease management. Moreover, the therapeutic approach predominantly depends on the severity of the disease and on physician's perspective. In present study, among oral drug combination therapy, Sitagliptin + Metformin (50%) was the most commonly prescribed followed by metformin + SUs (46.15%). Among the second generation SUs, glimepiride was prescribed most (30.77%) in combination with Metformin. Several studies showed that a combination of SU with Metformin has been most widely used^{5,9,24}.

Among combination therapy based on class, Metformin + DPP4i (36.11%) were prescribed most followed by Metformin + SUs (34.72%) and Metformin + Insulin (27.78%) respectively. In contrast, Kumar et al in their study observed Insulin + Metformin (16.60%) was the most prescribed anti-diabetic combination followed by Glimepiride + Metformin (10%)²⁵.

In present study, 84 patients had at least one co-morbidity and hypertension (either alone or with other comorbidities)

(71.43%) was the commonest co-morbidity observed. Though commonest, lesser prevalence of hypertension was observed in similar studies by Ahmed et al³ (34.50%), Kannan et al⁵ (33.33%), John LJ et al¹⁹ (57.80%), Joshi et al²¹ (67.50%). High prevalence of hypertension was associated with increased stiffness of large arteries, which often precedes macrovascular events.

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