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Research Article

**EVALUATION OF TREATMENT OF TYPE 2 DIABETES MELLITUS
AND ITS COMPLICATIONS AT A TERTIARY CARE TEACHING
HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY****¹Shaik Sultan Basha, ¹Qudrath Ullah Khan, ¹Mohammed Abdul Mannan, ¹Abdul
Waheed and ²Syeda Rana Nikhat***¹Pharm-D, MESCO college of Pharmacy, affiliated to Osmania University, Hyderabad,
Telangana, India.²Associate Professor, M.Pharm, PhD, Department of Pharmacology, MESCO College of
Pharmacy, Mustaidpura, Karwan Road, Hyderabad - 500006. Telangana. INDIA.**Abstract:**

OBJECTIVS: To identify common complications in type-2 DM, also commonly prescribed medications to treat them along with type-2 DM and to identify adverse drug reaction and drug-drug interactions during the course of treatment at tertiary care teaching hospital.

MATERIALS AND METHODS: A total of 100 patients with presumed and/or confirmed T2DM along with DM complications were observed. The data recorded related to the disease parameters and the pattern of treatment regimen were further evaluated as per ADA guidelines. The MMAS-4 was used to determine patient's adherence to medications, Hartwig's Severity Assessment Scale to determine severity of adverse reaction and Micromedex® drug interactions and drug information android app was used to determine drug-drug interactions and adverse reactions.

RESULTS: A total of 100 prescriptions of the T2DM patients receiving antidiabetic agents were evaluated, among which 71% were male and 29% were female, with 42% of diabetic history of less than 5 years and 74% shown high adherence to the prescription. Most were found to exhibit more than one complication and among macrovascular complications, hypertension (73 cases) is more prevalent and among microvascular complication, nephropathy (32 cases) was found to be more common. Majority of the potential DDIs were of moderate severity, ADRs were of moderate severity and the interactions were pharmacokinetic in nature in our study.

CONCLUSION: In this study, Diabetes Mellitus associated complications were identified and management of complications were evaluated. This study shows the drug utilization pattern of complications among type-2 diabetic patients. The present study suggests that the clinical pharmacist involvement in disease management can have positive impact in creating awareness about the disease.

Keywords: Type 2 Diabetes Mellitus, Anti-diabetic Agents and Diabetic Complications.

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INTRODUCTION:

Once regarded as a single disease, diabetes is now seen as a heterogeneous group of diseases, characterized by state of hyperglycemia resulting from a diversity of etiologies, environmental and genetic acting jointly. Defective production and action of insulin is the underlying cause. It is a long term disease with variable manifestations and progression. [1]

Diabetes is an “Ice berg” disease. Recent estimates across worldwide is 4% in adult i.e., 145 million now effected. By 2045, it is projected to be 10.6% amounting to an alarming 400 million. Major burden is occurring in developing nations like India. At present incidence is 2.4% in rural, 4-11% in urban population of India. Prevalence of diabetes mellitus increase after age 40 years, 15-20% after age of 65 years. The cost of health care and burden over families is huge, eventually causing a staggering economic instability to the nation. Hence it's worthwhile to know more about diabetes, its implications, and intensive interventions to improve diet and physical activity and its management. [1]

Knowledge and awareness of DM and its complication can help early detection of complication and adopt prophylactic treatment for prevention and delay the progress of complication of DM. The purpose of the study is to evaluate the pattern of drug use that will help to ensure that medicines are used appropriately and thus improve patient care and outcomes. Minimizing the risk for drug interactions and adverse drug reaction should be a goal in drug therapy because interactions can result in significant morbidity and mortality.

MATERIALS AND METHODS:

A Hospital based Prospective, Observational Study was carried out for a period of Six (6) months at Outpatient, Department of Endocrinology and Inpatient, Department of General Medicine, Osmania General Hospital, a Tertiary Care Teaching Hospital.

Sample Size: Patient size selected for the study is 100.

Inclusion Criteria:

- Patients of either sex, more than 18 years of age
- Patients with Type 2 Diabetes Mellitus and complications.
- In patients and out patients with Type 2 Diabetes Mellitus

Exclusion Criteria:

- Refusal to be a part of the study
- Pregnant & lactating women
- Patients with Type 1 Diabetes Mellitus

This study was approved by *Institutional Ethics Committee*.

Procedure for data collection:**Sources of Data:**

- Observing patient's medical or case record.
- Interviewing patient or patient's attendees.
- Interviewing the physicians attending the study patients.
- Available literatures.

DATA ANALYSIS:

Descriptive statistics is done by measuring different proportions using Microsoft Excel 2007. The results were represented in the form of percentages, graphs and tables using Microsoft Excel 2007.

RESULTS:

A total of 100 prescriptions of the T2DM patients receiving antidiabetic agents were evaluated. Among the subjects studied, 71% were male and 29% were female and majority of patients in the study belonged to the age group 50-59(37%) followed by age group 60-69(25%) then 40-49 years (24%). Among the study population, 42 patients (42%) had a diabetic history of less than 5 years which is the highest, followed by 6-10 years in 28 patients (28%), 11-15 years in 16 patients (16%), 16-20 years in 11 patients (11%) and more than 20 years in 3 patients (3%) which is the least. Of the study population, most of the subjects have shown high adherence to the prescription accounting for 74% followed by low and medium adherence accounting 14% and 12% respectively. The medication adherence has been assessed with the 4-item Morisky's Medication Adherence Scale (MMAS-4). Of the study population, Diabetic Ketoacidosis have been the major Acute Diabetic Complication and among the microvascular complication, Diabetic Nephropathy 32, were found to be major followed by Diabetic Neuropathy 10 and Diabetic Retinopathy 2 and among the macrovascular complication Peripheral Vascular Disease (HTN, 73) were found to be major followed by Cardiovascular Disease (CAD, 25) then Cerebrovascular Disease (Stroke, 23) and Diabetic Foot (19). Of the study population, 51% were found to exhibit Double complication followed by 23% Triple, 16% Single and 4% Multiple complications.

Table-1: DEMOGRAPHIC CHARACTERISTICS AND CLINICAL FINDING OF T2DM PATIENTS.

Variables			No of patients (n=100)	Percentage of Pa
SEX DISTRIBUTION				
Male			71	71.00%
Female			29	29.00%
AGE WISE DISTRIBUTION				
Age groups	Male	Female		
20-29	0	0	0	0
30-39	5	2	7	7.00%
40-49	19	5	24	24.00%
50-59	27	10	37	37.00%
60-69	16	9	26	26.00%
>70	4	3	7	7.00%
DURATION OF DIABETES				
<5 years			42	42.00%
6-10 YEARS			28	28.00%
11-15 YEARS			16	16.00%
16-20 YEARS			11	11.00%
>20 YEARS			3	3.00%
MEDICATION ADHERENCE				
Low			14	14.00%
Medium			12	12.00%
High			74	74.00%
ACUTE COMPLICATIONS				
Diabetic Ketoacidosis			14	14.00%
Hyperglycemic Hyperosmolar State (HHS)			0	0
CHRONIC MICROVASCULAR COMPLICATIONS				
Retinopathy			2	2.00%
Neuropathy			10	10.00%
Nephropathy			32	32.00%
CHRONIC MACROVASCULAR COMPLICATIONS				
Peripheral vascular disease			73	73.00%
Cardiovascular disease			25	25.00%
Cerebrovascular disease			23	23.00%
Diabetic foot			19	19.00%
FREQUENCY OF OCCURRENCE OF T2DM COMPLICATIONS				
Single			16	16.00%
Double			57	57.009%
Triple			23	23.00%
Multiple			4	4.00%

Of the study population, diabetic neuropathy (10) were majorly prescribed with Cyclic Gamma aminobutyric acid (Pregabalin, Gabapentin), followed by Opioid (Tramadol), Hydantoin (Phenytoin), Tri-Cyclic Antidepressant (Nortriptyline, Amitriptyline), Benzodiazepine (Clonazepam, Midazolam), Optineuron.

TABLE-2: PRESCRIPTION PATTERN IN DIABETIC NEUROPATHY

DRUGS USED IN THERAPY OF NEUROPATHY	NO. OF PRESCRIPTIONS (N=10)
HYDANTION	
Phenytoin	4
CYCLIC GABA ANALOGUE	
Pregabalin	5
Gabapentin	2
TRICYCLIC ANTI-DEPRESSANTS	
Nortriptyline	2
Amitriptyline	1
BENZODIAZEPENES	
Midazolam	1
Clonazepam	1
OPIOIDS	
Tramadol	5
TYPES OF INSULIN	
Regular Insulin	8
ORAL HYPOGLYCEMIC AGENTS	
Metformin	3
Glimepiride	3

Of the study population, diabetic nephropathy (32) were majorly prescribed with diuretics (Furosemide) followed by Angiotensin Converting Enzyme Inhibitors (Enalapril), Calcium Channel Blockers (Amlodipine), β -adrenergic blocker (Metoprolol, Carvedilol), Angiotensin Receptor Blocker (Telmisartan).

TABLE-3: PRESCRIPTION PATTERN IN DIABETIC NEPHROPATHY

CLASS OF DRUGS	DRUGS USED IN THERAPY OF CEREBROVASCULAR DISEASE	NO. OF PRESCRIPTIONS(N=23)
OD	Mannitol	4
LLA	Atorvastatin	22
APA	Aspirin	17
APA	Clopidogrel	4
ACEI	Enalapril	7
CCB	Amlodipine	11
MVT	Optineuron	15
HYDANTOIN	Phenytoin	3
INSULIN	Regular. Insulin	22
OHA	Metformin	8

OD- Osmotic Diuretic, LLA- Lipid Lowering Agent, APA- Antiplatelet Agent, ACEI- Angiotensin Converting Enzyme Inhibitors, CCB-Calcium Channel Blockers, MVT- Multivitamin, OHA-Oral Hypoglycemic Agent.

In the study population, 23 patients were having cerebrovascular disease with HTN, were majorly prescribed with Calcium Channel Blockers (Amlodipine), Angiotensin Converting Enzyme Inhibitors (Enalapril) followed by Atorvastatin, Aspirin, Clopidogrel and mannitol.

TABLE-4: PRESCRIPTION PATTERN IN DIABETIC CEREBROVASCULAR DISEAS

CLASS OF DRUGS	DRUGS USED IN THERAPY OF NEPHROPATHY	NO OF PRESCRIPTIONS (N=32)	PERCENTAGE
ARB	Telmisartan	1	1.00%
ACEI	Enalapril	9	10.00%
LOOP DIURETICS	Furosemide	24	28.00%
K+ SPARING	Spiro lactone	4	5.00%
CCB	Amlodipine	12	14.00%
BB	Carvedilol	2	2.00%
	Metoprolol	3	5.00%
INSULINS	Regular. Insulin	25	29.00%
	Insulin Isophane Human / Insulin Regular	2	2.00%
OHA	Metformin	4	5.00%

ARB-Angiotensin Receptor Blockers, ACEI- Angiotensin Converting Enzyme Inhibitors, CCB-Calcium Channel Blockers, BB-Beta-Blockers, OHA-Oral Hypoglycemic Agent

In the study population, 25 patients with cardiovascular disease(CVD), combination therapy of aspirin, Clopidogrel and Atorvastatin given to patients with coronary artery disease along with Angiotensin Converting Enzyme Inhibitors (Enalapril) and Diuretics(Furosemide) if associated with HTN.

TABLE- 5: PRESCRIPTION PATTERN IN DIABETIC CARDIOVASCULAR DISEASE

CLASS OF DRUGS	DRUGS USED IN THERAPY OF CARDIOVASCULAR DISEASE	NO. OF PRESCRIPTIONS (N=25)	PERCENTAGE
APA	Aspirin	23	17.00%
	Clopidogrel	19	14.00%
LLA	Atorvastatin	22	16.00%
ACEI	Enalapril	13	10.00%
LD	Furosemide	14	10.00%
BB	Metoprolol	4	3.00%
IA	Digoxin	4	3.00%
AC	Heparin	8	6.00%
INSULIN	Regular. Insulin	21	16.00%
OHG	Metformin	6	5.00%

APA- Antiplatelet Agent, LLA- Lipid Lowering Agent, ACEI- Angiotensin Converting Enzyme Inhibitors, LD- Loop Diuretics, BB-Beta-Blockers, IA- Inotropic Agent, AC- Anticoagulant, OHA-Oral Hypoglycemic Agent.

PRESCRIPTION PATTERN IN DIABETIC FOOT

In the study population, 19 patients with diabetic foot were majorly undergone surgical procedure like ulcer debridement followed by wound dressing with magnesium Sulphate and glycerin and a wide range of antibiotics were prescribed like metronidazole, piperacillin + tazobactam, amoxicillin + Clavunate, Meropenam. For pain management tramadol and Chymerol forte were majorly prescribed.

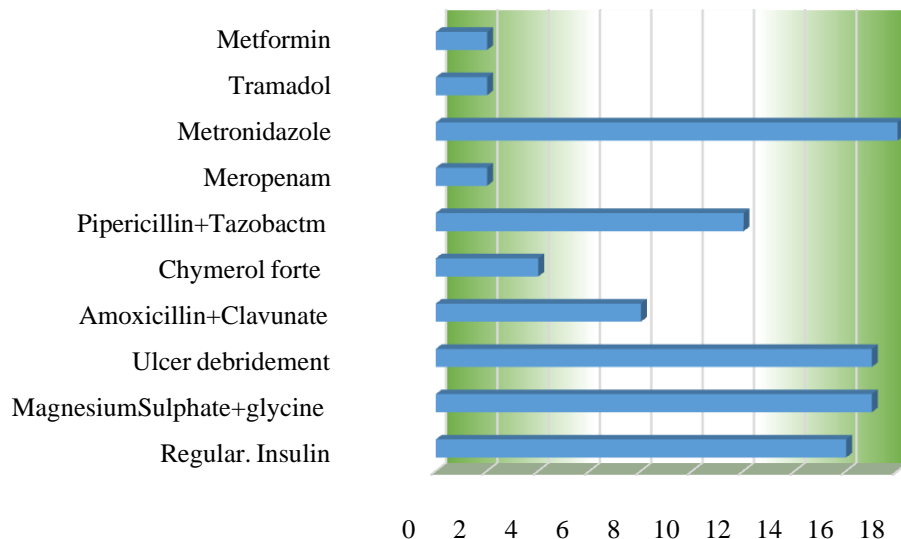


FIGURE-1: Bar graph showing prescription pattern in diabetic foot

Of the study population, among 100 patients 20% of the patients developed various side effects. The major adverse effect was found to be hypoglycemia (n=13), followed by injection site reaction (n=2), vitamin B12 malabsorption (n=1), weight loss (n=1) vomiting & loose stools (n=2) and GI bleeding (n=1), symptoms was found to be related to Sulphonyl ureas, Insulin, Metformin and Aspirin+Clopidogrel. Majority of the ADRs were of moderate severity. Action taken at the time of ADR is hold on OHA, change in the site of injection and symptomatic treatment respectively.

TABLE-6: NUMBER OF ADVERSE DRUG REACTION (ADRS) CLASSIFIED BY REACTION TYPE AND SEVERITY

REACTION TYPE	DRUGS/CLASSES	ADR	ACTION(S) TAKEN	SEVERITY	NO. ADRS
ENDOCRINE METABOLIC	SULPHONYL UREAS	HYPOGLYCEMIA	STOP OHA.	MODERATE	13
GASTROINTESTINAL	BIGUANIDES	VITAMIN B ₁₂ DEFICIENCY	STOP OHA.	MODERATE	5
		VOMITING AND LOOSE STOOL	SYMPTOMATIC TREATMENT		
		WEIGHT LOSS	STOP OHA		
	ASPIRIN + CLOPIDOGR EL	GI BLEED	STOP ANTIPLATELET		
DERMATOLOGIC	INSULIN	INJECTION SITE REACTION	CHANGE SITE OF INJECTION	MODERATE	2

Of the study population, the drug interactions of 100 prescriptions were analyzed and majority of the potential DDIs were of moderate severity, followed by major severity. A majority of the interactions were pharmacokinetic in nature.

TABLE-7: MOST COMMON POTENTIAL DRUG-DRUG INTERACTION

TYPES OF PDDIS	SEVERITY	FREQUENCY(N=100)	OUT COMES	MECHANISM
ASPIRIN+METFORMIN & GLIMIPERIDE	MAJOR	7	↑RISK OF HYPOGLYCEMIA	PHARMACOKINETIC
AMLODIPINE+CLOPIDOGREL	MAJOR	4	↓ ANTIPLATELET EFFECT	
ENALAPRIL+SPIRONOLACTONE	MAJOR	2	HYPERKALEMIA	
ASPIRIN+CLOPIDOGREL	MAJOR	19	↑RISK OF BLEEDING	PHARMACODYNAMIC
ASPIRIN+FUROSEMIDE	MAJOR	19	↓ DIURETIC EFFECTIVENESS	
HEPARIN+ASPIRIN/CLOPIDOGREL	MAJOR	7	↑RISK OF BLEEDING	
METFORMIN/GLIMIPERIDE+METOPROLOL	MODERATE	8	↑RISK OF HYPOGLYCEMIA	PHARMACOKINETIC
METFORMIN/GLIMIPERIDE+ENALAPRIL	MODERATE	13	↑RISK OF HYPOGLYCEMIA	
CLOPIDOGREL+ATORVASTATIN	MODERATE	7	HIGH ON-TREATMENT PLATELET REACTIVITY	
ENALAPRIL+FUROSEMIDE	MODERATE	9	POSTURAL HYPOTENSION	
INSULIN+ASPIRIN	MODERATE	28	↑RISK OF HYPOGLYCEMIA	
INSULIN+FUROSEMIDE	MODERATE	21	↑RISK OF HYPERGLYCEMIA	
ASPIRIN+ENALAPRIL	MODERATE	6	↓ EFFECTIVENESS OF ENALAPRIL	PHARMACODYNAMIC
METOPROLOL+ASPIRIN	MODERATE	3	↑BP	

DISCUSSION:

Diabetes Mellitus (DM) is a disease of improper metabolism of carbohydrate, proteins, and fat. Diabetes is associated with various other complications such as cardiovascular problems, nephrological, and neurological problems. Thus, very often, diabetic patients are compelled to prescribe with a number of medications.

The present study was designed to evaluate the treatment of type 2 Diabetes Mellitus and its complication of the patients attending the tertiary care hospital.

In the present study, total number of 100 T2DM patients' prescriptions were studied, Out of which 71% were males and 29% were females. Similar observations were reported also published by Rania

et al., 2018. [2] And we found a higher incidence of diabetes among elderly patients, with a high incidence (36%) in the age group 51–60 years and similar report was also published by Arun et al., 2018. [3]

In the present study, the complications were classified as Acute and Chronic complications (Microvascular complications and Macrovascular complications). 14% cases have exhibited acute complication, DKA. Of microvascular complications, 32% were found to exhibit nephropathy followed by diabetic foot 19%, neuropathy 10% and retinopathy 2% and of macrovascular complications, 73% were with Peripheral Vascular Disease particularly Hypertension, 25% cardiovascular disease and 23% cerebrovascular diseases.

Most of the patient were found to exhibit more than one complication and grouped as single (one complication), double (two complications), triple (three complications) and multiple (more than three) from which double complication accounted for 57% which is more than triple 23%, single 16% and multiple 4%.

Polypharmacy comprises of multiple drugs with complex drug schedule which are often difficult to be followed by patients suffering from T2DM who commonly show other concomitant diseases like hypertension, dyslipidemia, which may be linked with increase in the pill burden for the patient but also aggravates the chance of confusion in taking medication, decreased medication adherence (poor adherence), is also associated with potential drug interactions and adverse effects. [2]

However, reduction in number of drugs might cause under treatment, resulting in serious consequences. Thus, pharmacist may have significant role on optimization of the drug and dosage regimen for maximum benefit of patient. [2]

Evidence based treatments fail to succeed because of the human factor known for a few decades as patient non-adherence. Currently, sound theoretical foundations for adherence-enhancing interventions are lacking. Therefore, the development of interventions to enhance patient adherence to medication, and maintain long term persistence, requires at least an understanding of the determinants of patient non-adherence to prescribed therapies. This is especially important when the determinants are modifiable risk factors, which once identified can then be targeted for beneficial changes.

In the present study, medication adherence was assessed by using the MMAS-4 which was done on in-patients. In this 74% of the patient exhibited high adherence to medications.

In the present study, 42% of the patients had a duration of T2DM of less than 5 year, a similar finding was reported by Upadhyay et al.,2007 [4].

The American Diabetes Association/European Association for the Study of Diabetes (ADA/EASD) and the American Association of Clinical Endocrinologists/American College of Endocrinology (AAACE/ACE) recommended early initiation of metformin monotherapy as a first-line drug and as combination {Sulphonyl ureas, Alpha glucosidase inhibitor, DDP4 inhibitor} therapy for T2DM patients if necessary. This recommendation is based primarily on metformin's glucose-lowering

effects, relatively low cost, and generally less of side effects, including the absence of weight gain.

In the present study, metformin was the most common and first prescribed medication in and out patients. Out of 100 subjects, 100% were receiving metformin either as monotherapy or combination with other medications. This is in accordance with the recent ADA guidelines 2019.

In our study, 100% in-patients are routinely treated with regular insulin as first-line or added to either dual or triple regimen.

The choice of perfect antihypertensive remains elusive and dictated by patient's age, associated comorbidities such as chronic kidney disease (CKD), CAD, state of diabetes and hypertension, and other factors. In the present study, ARB (Telmisartan) or ACEI (Enalapril) are given for treating peripheral vascular disease (HTN) followed by CCB (amlodipine), patients with elevated total cholesterol or LDL cholesterol were given Atorvastatin, which is consistent with Arun et al., 2018. [3]

In the present study, out of 25 patients with cardiovascular disease (CVD), combination therapy of aspirin, Clopidogrel and Atorvastatin given to patients with coronary artery disease along with ACEI (Enalapril) and Diuretics (Furosemide) if associated with HTN, which is consistent with Arun et al., 2018. [3]

In treatment of cerebrovascular disease with HTN, drugs prescribed were CCBs (Amlodipine), ACEI (Enalapril) followed by Atorvastatin, Aspirin, Clopidogrel and mannitol for cerebral edema are the most commonly prescribed drug.

Majority of patients who develop complications are known diabetics on irregular treatment and who give the history of trivial injury before the onset of lesions and have a longer hospital stay. Lower limbs are most commonly involved followed by upper limbs. Out of 19 patients with diabetic foot were majorly undergone surgical procedure like ulcer debridement followed by wound dressing with magnesium Sulphate and glycerin and a wide range of antibiotics were prescribed like metronidazole, piperacillin + tazobactam, amoxicillin + Clavunate, Meropenam. For pain management tramadol and Chymerol forte were majorly prescribed.

Intensive diabetes therapy, intensive multifactorial cardiovascular risk reduction and lifestyle intervention are recommended in patient with

Neuropathies. In the present study, diabetic neuropathy (10) were prescribed with Cyclic GABA Analogue (Pregabalin, Gabapentin), followed by Opioid (Tramadol), Hydantoin (Phenytoin), TCA (Nortriptyline, Amitriptyline), Benzodiazepine (Clonazepam, Midazolam), and Optineuron which is in contrast with Arun et al., 2018. [3]

Early detection of diabetic nephropathy, adoption of multifactorial interventions targeting the main risk factors (hyperglycemia, hypertension, dyslipidemia, and smoking), and use of agents with a renoprotective effect (ACE inhibitors and/or ARBs) do indeed reduce the progression of renal disease. Treatment of hypertension is a priority. Attention to these procedures will also ensure the reduction of cardiovascular mortality. [5]

In the present study, diabetic nephropathy (32) was prescribed with diuretics (Furosemide) followed by ACEI (Enalapril), CCB (Amlodipine), β -adrenergic blocker (Metoprolol, Carvedilol) and ARB (Telmisartan).

The actual and potential DDIs increase as per number of drugs in prescription. The management of clinically relevant DDIs can be improved by clinical pharmacist interventions. Advice on withdrawal or substituting the precipitant drug would be beneficial measurement of adherence is associated with improving and maintaining health outcomes and quality of life in patients with diabetes.

In the present study, the drug interactions of 100 prescriptions were analyzed and majority of the potential DDIs were of moderate severity, followed by major severity. This observation was found to be consistent with a study conducted by Khan et al., 2019[6], which reported a higher number of moderate (55%) followed by major severity (45%) potential DDIs. A majority of the interactions were pharmacokinetic in nature.

The present study revealed that among 100 patients, (20%) of the patients developed various side effects. The major adverse effect was found to be hypoglycemia (n =13), followed by injection site reaction (n=2), vitamin B12 malabsorption (n=1), weight loss (n=1) vomiting & loose stools (n=2) and GI bleeding (n=1), symptoms was found to be related to Sulphonyl ureas, Insulin, Metformin and Aspirin with Clopidogrel. Majority of the ADRs were of moderate severity in our study. This observation is consistent with a study conducted by Manandhar et al., 2017[7]. For management of ADRs OHA are held, site of injection is changed and symptomatic

treatment is instituted.

CONCLUSION:

In this study, Diabetes Mellitus associated complications were identified and management of complications were evaluated. This study shows the drug utilization pattern of complications among type-2 diabetic patients. It can be concluded from our findings that, male patients were more affected than female patients and those between age group of 50-59 years are more common and had a diabetic history of ≤ 5 years. Measurement of adherence is associated with improving and maintaining health outcomes and quality of life in patients with diabetes. Among the various complications, macrovascular complications caused major threat. Among macrovascular complications, hypertension is more prevalent and among microvascular complication nephropathy was found to be more common. Most of the patient were found to exhibit more than one complication. The study also conclude that the majority of patients had a diabetic duration of < 5 years and high medication adherence percentage (74%). The most commonly prescribed drug for management of T2DM in inpatient is insulin (Insulin Human Regular), followed by Biguanides and sulphonyl ureas. Most of the patients were administered insulin subcutaneously/ IV Infusion. The management of complications were in accordance with the recommended ADA guidelines. The assessment of ADR and Classification of ADRS by reaction severity, reaction type, and drug class have been useful in identifying occurrence of adverse drug reaction and majority of ADRs were found with moderate severity. This study was successful in identifying the incidence and pattern of potential drug-drug interactions in diabetic inpatients. The patients who were taking a higher number of drugs had a greater risk of experiencing DDIs. The present study showed that the clinical pharmacist involvement in prescription monitoring can have positive impact in the disease management plan.

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