Evaluation of Rationality in Pharmacotherapy of Diabetes Mellitus

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ABSTRACT

Diabetes mellitus is a clinical syndrome characterized by chronic hyperglycemia & disturbances in carbohydrate, lipid and protein metabolism. The disease may result from defects in insulin secretion, insulin action or both. Data of 6 patient's histories were collected from different ward on sheet containing the following information i.e. patient demographics data, family history, laboratory data and diagnosis, treatment at hospital and discharge medications. Important parameters of data were analyzed as follows: significant findings of medication history, rationality & outcomes of pharmacotherapy provided in the hospital, identification & management of drug related problems, drug information and therapeutic consultation provided in the hospital. Out of total 6 patients, 4 were males and 2 were females. According to age wise distribution, disease is more prevalent in patients of age 61-70 years. Outs of total 6, 5 patients were type 2 diabetic while 1 was type 1 Diabetes Mellitus patients. Co-morbid illnesses were hypertension, congestive heart failure & chronic kidney disease. Significant findings of medication history show proper response in most of the patients. After the analysis it was observed that prescriptions have potential drug interactions. In the data of 6 Diabetic patients, with reference to Drugs.com, Medscape & WebMD all the identified interactions were moderate. It was also observed that few of the patients are non-compliant with drug therapy, due to lack of guidance and counseling, as physicians having a greater workload and don't guide patients properly. Lab tests such as FBS, RBS, HbA1C, OGTT, complete blood picture, liver function tests, renal function tests and serum electrolytes were used for the assessment of outcome of therapy. From this study it is quite clear that clinical pharmacists can play a vital role in optimizing the therapy. Hence there is a need of clinical pharmacist in hospital setting in order to rationalize the therapy.

INTRODUCTION

Diabetes is a metabolic disorder of the endocrine system which affect approximately 537 million people throughout the world. Each year more than 7000,000 new cases are reported; 12,000 to 14,000 of which are children, adolescent and adults, but this life threatening can be controlled (Lipsky *et al.*, 1990). The term diabetes mellitus describes a metabolic disorder of multiple etiology characterized by chronic hyperglycemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action, or both (Alam *et al.*, 2014). The effects of diabetes mellitus include long term damage, dysfunction and failure of various organs. Diabetes mellitus may present with characteristic symptoms such as thirst, polyuria, blurring of vision, and weight loss (Davison, 2015). In its most severe forms, ketoacidosis or a non-ketotic hyperosmolar state may develop and lead to stupor, coma and in the absence of effective treatment may cause death. People with diabetes are at increased risk of cardiovascular, peripheral vascular and cerebrovascular disease (Swarna *et al.*, 2012).

There are two major types of diabetes mellitus. Type 1 indicates the processes of beta-cell destruction that may ultimately lead to diabetes mellitus in which "insulin is required for survival" to prevent the development of ketoacidosis, coma and death (Katsarou *et al.*, 2017) . Type 2 is the most common form of diabetes and is characterized by disorders of insulin action and insulin secretion, either of which may be the predominant feature (DeFronzo *et al.*, 2015). Diabetes therefore is a real public health problem. There are more than 100 million diabetics worldwide (Whiting *et al.*, 2011). The term diabetes actually covers two different diseases: insulin-dependent diabetes [type1], which occurs most often before the age of 20 and represents 10 to 15% of diabetes, Non-insulin-dependent diabetes [type 2], which occurs most often after the age of 50 and accounts for 85 to 90% of diabetes (Whiting *et al.*, 2011). The risk factors of diabetes can be classified into two categories, irreversible risk factors and modifiable risk factors (Jiang *et al.*, 2015) . Irreversible risk factors include race/ethnicity, familial aggregation, genetic factors, age and gender (Alam *et al.*, 2021). Modifiable risk factors are: obesity, physical inactivity, quantity and quality of fat consumed, quantity and quality of carbohydrates consumed, micronutrients [vitamin E, magnesium, chromium], alcohol intake, intrauterine environment and environmental factors (Lapolla *et al.*, 2011).

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed

by demonstrating any one of the following: fasting plasma glucose level ≥7.0mmol/l [126mg/dl], Plasma glucose≥11.1mmol/l [200mg/dl] two hours after a 75g oral glucose load as in a glucose tolerance test, symptoms of hyperglycemia and casual plasma glucose ≥11.1mmol/l [200mg/dl] (American Diabeties Association, 2021). Diabetes mellitus is a chronic disease, for which there is no known cure except in very specific situations. Management concentrates on keeping blood sugar levels as close to normal ["euglycemia"] as possible, without causing hypoglycemia. (Petersmann *et al.*, 2019) This can usually be accomplished with diet, exercise, and use of appropriate medications [insulin in the case of type1 diabetes, oral medications, as well as possibly insulin, in type2 diabetes] (American Diabeties Association, 2023). Major components of the treatment of diabetes are, diet [combined with exercise if possible], oral hypoglycemic therapy, insulin treatment (Nathan, D.M. 2015).

Agents that bind to the sulfonylurea receptors and stimulate insulin secretion are Sulfonylurea [glimepiride, glipizide], Meglitinides [repaglinide, nateglinide] (Skyler, 2004) . Agents that lower glucose levels by their actions on liver, muscle and adipose tissues are Biguanides [metformin], Thiazolidinediones [pioglitazone, rosiglitazone] (Bastaki, 2005). Agents that inhibit the reabsorption of glucose in the kidney sodium-glucose co-transporter inhibitors [canagliflozin, dapagliflozin, empagliflozin] (Deshmukh *et al.*, 2015). WHO defines rational use of drug as: Rational use of medicines requires that "patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community" [WHO] (Nathan, 2015).

MATERIALS AND METHOD

SAMPLING SITE

The study was conducted at multiple healthcare setting including: Ayub Teaching Hospital, (ATH) Abbottabad, POF Hospital, DHQ Hospital, Haripur, Yahya Hospital Haripur, Allama Iqbal Hospital Haripur.

SAMPLE SIZE

Sample of 6 prescriptions was collected.

METHOD

The methodology adopted to collect data was same from the three places:

DATA COLLECTION

Patients admitted to hospital during the said period were included in this work. Following data were collected: Patient's Demographics Information, Chief Complaints, History of Present Illness, Past Medical History, Past Surgical History, Family History, Personal History, Allergies, Medication History, Laboratory Data, Diagnosis, Drug-Therapy Provided in The Hospital, Monitoring Notes, Discharge Medications, Treatment Outcomes and Other Patient Information.

CASE HISTORIES

Total 6 Case Histories of patients suffering from Diabetes Mellitus were recorded in this hospital based study.

Inclusion Criteria: 6 Case histories of patients diagnosed with Diabetes Mellitus who were admitted in different ward of the DHQ Hospital Haripur, Ayub Medical Complex Abbottabad & POF's Hospital, Yahya Hospital Haripur, Allama Iqbal Hospital Haripur were recorded for this study. There were no gender restrictions however children below 10 years of age were not included.

Exclusion Criteria: Incomplete case histories were excluded from the study. Also patients with age less than 10 years were also excluded from study

DATA COLLECTION AND CASE EVALUATION

Medication history of each patient was analyzed for drug allergies, response, undesirable effects, drug interactions, compliance and its application in the assessment & management of patient's current medical problems. Therapy provided to the patient was analyzed for its indications and clinical outcomes. The whole medication therapy provided in the hospital was analyzed for the drug related problems and their management. Drugs.com, WebMD & Medscape is used to analyze drug-drug interactions in prescription of diabetes patients. Any drug information/therapeutic-consultation or patient education and counseling that were provided during rotations were also reported.

RESULT INTERPRETATION

Microsoft Excel was used to graphically present the data and perform various statistical

calculations. The following calculations were performed:

Gender wise distribution of the disease in the recorded cases., Age wise distribution, Number of interactions per prescription, Types of interaction on the basis of severity, Drug related problems in medication histories, Co-Morbid conditions in patients suffering from diabetes, Frequency of Medication in prescription of diabetes patient etc.

CASE WISE ANALYSIS

CASE NO 01

PATIENT'S Name: Gulwarena Bibi   **AGE:** 55 years

GENDER: Female   **Ward:** FMW

BED NO: 8   **DATE of Admission:** 19-04-24

ALLERGIES: Nill   **ADDRESS:** Haripur

CHIEF COMPLAINTS: Appendictomy (+ive), abdominal pain, vomiting

PAST HISTORY: Diabetes mellitus (6 years)

PERSONAL HISTORY: Married

GENERAL PHYSICAL EXAMINATION

- B.P ……………..   90/60
- PULSE…………... 49 beats/min
- RESPIRATORY SYSTEM…………….. clear
- CARDIO VASCULAR SYSTEM……………. S1+S2+0
- GASTRO INTESTINAL SYSTEM……………… normal

INVESTIGATIONS

Date	Test	Result	Normal value
19-10-23	Blood urea	45mg/dl	10-50 mg/dl
	Fasting blood sugar	338mg/dl	65-100mg/dl
	Serum creatinine	1.2mg/dl	0.5-1.5mg/dl
	HbA1C	10.8%	4.27-6.5%

DIAGNOSIS: Diabetes mellitus type

MEDICINES TAKEN BEFORE ADDMISSION: Humuline 70/30

TREATMENT PROVIDED AT WARD LEVEL

Date	Medicines trade name	Generic Name	Strength	Signa
19-10-23	Normal saline 0.9%		0.9%	TDS
	Humulin	Insulin	70/30	TDS
	Toradol inj i/v	ketorolac	30mg/ml	BD

TREATMENT FOR HOME

Date	Medicine's trade name	Generic name	Strength	Signa
20-10-23	Tab glucophage XR	Metformin	750 mg	BDS
	Inj humulin R	Insulin	70/30	TDS

DRUGS INTERACTION

Metformin + Insulin: a moderate interaction may cause hypoglycemia by pharmacodynamics synergism. Co-administration of metformin with an insulin secretagogue (e.g., sulfonylurea, meglitinide) or insulin may potentiate the risk of hypoglycemia.[1]

REFERENCE: Drugs.com[1]

ADVERSE EFFECTS

Nausea and Vomiting

COMPLIANCE

Patient show good response to the therapy.

CASE NO. 2

PATIENT'S NAME: Niyaz Bacha   **AGE:** 65 year

GENDER: Male   **WARD:** Medical

BED NO: 10   **DATE OF ADMISSION:** 07-04-24

ALLERGIES: Nill   **ADDRESS:** Abbotabad

CHIEF COMPLAINTS

- Fever
- Burning of foot
- Numbness of foot
- Numbness of left foot
- Frequent urination

PAST MEDICAL HISTORY

- Chronic kidney disease

FAMILY HISTORY

- 2 sisters diabetic

INVESTIGATIONS

Date	Test	Results	Normal range
7-9-23	CBC	WBC: 12.5×10.e3/μl	4-11×10.e3/μl
		RBC: 1.52×10.e6/μl	4-6×10.e6/μl
		HGB: 3.5g/dl	11.5-17.5g/dl
	Clinical chemistry	T. billirubin:0.2 mg/dl	0.1-1.0 mg/dl
			18-45 mg/dl
		Blood urea:83 mg/dl	0.3-0.9 mg/dl
	RBS	287mg/dl	80-140mg/dl
	HbA1C	10.1%	4.27-6.5%

DIAGNOSIS

- Type 2 diabetes mellitus

MEDICINES TAKEN BEFORE ADMISSION

- DEXXOO 6 mg
- QAZZO 10 mg
- Zeegap 75 mg
- X- bone 0.5 mg
- Getryl 1 mg

TREATMENT AT WARD LEVEL

Date	Medicine trade name	Generic name	Strength	Signa
7-9-23	Tab Renavel	Sevelamer	400 mg	1×OD
	Tab NovoNorm	Repaglindie	1 mg	1×TDS
	Tab Lasix	Furosemide	20 mg	1×OD
	Tab ESSO	Esomeprazole	20 mg	1×OD

Tab Tretaan	Candesartan	8 mg	1×OD
Tab Lalap	Locasamide	50 mg	1×OD

TREATMENT FOR HOME

Date	Medicine's trade name with strength	Generic name	Strenght	Signa
10-9-23	Tab Renavel	Sevelamer	400 mg	1×OD
	Tab Novonorm	Repaglinde	1 mg	1×TDS
	Tab Lasix	Furosemide	20 mg	1×OD
	Tab ESSO	Esomeprazole	20 mg	1×OD
	Tab Tretan	Candesartan	8 mg	1×OD
	Tab Lalap	Locasamide	50 mg	1×OD

SIDE EFFECTS: Nill

DRUG INTERACTIONS: A moderate interaction between Repaglinide and furosemide were found, The efficacy of insulin and other antidiabetic agents may be diminished by certain drugs, including atypical antipsychotics, corticosteroids, diuretics, These drugs may interfere with blood glucose control because they can cause hyperglycemia, glucose intolerance, new-onset diabetes mellitus, and/or exacerbation of preexisting diabetes.[2]

REFERENCE: Drugs.com[2]

candesartan + furosemide candesartan increases and furosemide decreases potassium levels in the blood.[3]

REFERENCE: WebMD[3], Medscape[3]

CASE NO. 3

PATIENT'S NAME: Nasreen Begum **AGE:** 68 years

GENDER: female **WARD:** medical

BED NO: 16 **DATE OF ADMISSION:** 10-04-24

ALLERGIES: nill **ADDRESS:** Abbotabad

CHIEF COMPLAINTS

• Fever

- Productive cough with blood

PAST HISTORY

- Hyper tension
- Covid +ive
- Diabetes mellitus from last 12 years

PERSONAL HISTORY

No one in the family is diabetic

GENERAL PHYSICAL EXAMINATION

- B.P……….. 170/100
- PULSE…………. 78 beats/minute
- RESPIRATORY SYSTEM……….. bronchitus
- CARDIOVASCULAR SYSTEM……………. hypertension
- GASTRO INTESTINAL SYSTEM…………… normal

PAST MEDICAL HISTORY

Type 2 DM from last 12 years

INVESTIGATIONS

DATE	TEST	RESULT	NORMAL VALUES
10-10-23	CBC	WBC:6.8×10.e3/µl	4-11 ×10.e3/µl
		RBC:7.2×10.e6/µl	4-6 ×10.e6/µl
		PLT:487×10.e3/U/L	150-450 ×10.e3/µl
	Clinical chemistry	T.billirubin:0.61 mmol/L	0.1-1.0 mmol/L
			18-45 mmol/L
		Blood urea:67 mmol/L	40-129 U/L
		Alk.Phosphatase203U/L	0.64-1.2 mg/dl
		Creatinine:0.97 mg/dl	
	RBS	90 mg/dl	70-140 mg/dl
	CRP	14 mg/dl	<6.0 mg/dl
	HbA1C	7.6%	4.45-6.5%

DIAGNOSIS

Type 2 diabetes mellitus

MEDICINES TAKEN BEFORE ADDMISSION

Glucophage 500mg

TREATMENT PROVIDED AT WARD LEVEL

DATE	MEDICINES NAME	TRADE	GENERIC NAME	STRENGTH	SIGNA
	Tusin		Guaifenesin	120ml	TDS
	S.zole		Esomeprazole	90mg	OD
	Decardon		Dexamethasone sodium phasphate	10mg/ml	BD
	Inj Humulin R 8+0 8+0		Insulin	70/30	BD
	Tab Glucophage		Metformin	500 mg	1×BD
	Inj sulbaxone		Sulbactum+Cefoperazone	2 g	BD

TREATMENT FOR HOME

DATE	MEDICINES TRADE NAME	GENERIC NAME	STRENGTH	SIGNA
12-10-23	Inj Humulin R 8+0 8+0	Insulin	70/30	BD
	Tab Glucophage	Metformin	500 mg	1×BD
	Inj sulbaxone	Sulbactum+Cefoperazone	2 g	BD
	Tusin	Guaifenesin	120ml	TDS
	S.zole	Esomeprazole	40mg	OD

DRUG INTERACTIONS

Metformin + Insulin: A moderate interaction may cause hypoglycemia by pharmacodynamic synergism. Antidiabetic agent are often used in combination dosage adjustment s may be

required when initiating or discontinuing antidiabetic agents.[4]

Insulin + Dexamethasone: A moderate interaction was found, The efficacy of insulin and other antidiabetic agents may be diminished by certain drugs, including atypical antipsychotics, corticosteroids, diuretics, estrogens, These drugs may interfere with blood glucose control because they can cause hyperglycemia, glucose intolerance, new-onset diabetes mellitus, and/or exacerbation of preexisting diabetes.[5]

REFERENCE: Drugs.com[4],[5]

ADVERSE EFFECTS

Decrease appetite, diarrhea, nausea

COMPLIANCE

Patient shows poor compliance to therapy.

CASE NO. 4

PATIENT'S NAME: Sajida Munawar   **AGE:** 18 years

GENDER: Female   **WARD:** Medical

BED NO: 15   **DATE OF ADMISSION:** 03/05/24

ALLERGIES: Nill   **ADDRESS:** Haripur

 CHIEF COMPLAINTS

•   Weight loss

•   Uncontrolled blood sugar

•   Constipation

•   Stomach ache

•   RT middle finger infected

•   Shortness of breath

PAST MEDICAL HISTORY

•   Nill

FAMILY HISTORY

•   Grand mother is diabetic Investigations:

Date	Test	Results	Normal range
7/10/23	CBC	WBC: 12.7 ×10.e3/µl	4-11 ×10.e3/µl
		RBC: 5.22 ×10.e6/µl	4-6 ×10.e6/µl
		HGB: 17.8 g/dl	1.5-17.5 g/dl
		HCT: 48 %	36-54 %
		MCV: 92 FL	76-9 FL
		MCH: 34.1 Pg	27-33 Pg
		MCHC: 37.1 mg/dl	33-35 mg/dl
		PLT: 153 ×10.e3/µl	150-450 ×10.e3/µl
	Clinical chemistry	Sodium: 142 mmol/L	13-150 mmol/L
		Potassium:2.2 mmol/L	3.5-5.1 mmol/L
		Chloride: 124 mmol/L	96-112 mmol/L
		T.billirubin:0.4 mg/dl	0.1-1.0 mmol/L
		Blood urea:15 mg/dl	18-45 mmol/L
		ALT/GPT: 9µ/L	10-50 mmol/L
		Creatinine: 0.57 mg/dl	0.64-1.2 mg/dl
	HbA1C	11.2%	4.45-6.5%
	RBS	371 mg/dl	70-140 mg/dl

DIAGNOSIS

- Type 1 diabetes mellitus
- DKA

MEDICINES TAKEN BEFORE ADMISSION

- Inj Humulin R+N

TREATMENT AT WARD LEVEL

Date	Medicine trade name	Generic name	Strenght	Signa
7/10/23	Inj Humulin R+N 6+6 6+6 6+6	Insulin	70/30	TDS
	Inj Augmentin	Amoxycillin/clavulanate	1.2 g	TDS

TREATMENT FOR HOME

Date	Medicine's trade name	Generic name	Strength	Signa
9/10/23	Inj Humulin R+N 6+6 6+0 6+6	Insulin	70/30	TDS
	Tab Augmentin	Amoxycillin/clavulanate	875 mg	BD

SIDE EFFECTS

• Constipation

• **Drug interactions:**

• No interaction found

COMPLIANCE

• Patient shows good response to therapy.

CASE NO. 5

PATIENT'S NAME: Shahid Wadood   **AGE:** 38 years

GENDER: Male   **WARD:** Medical

BED NO: 20   **DATE OF ADMISSION:** 11/05/24

ALLERGIES: Nill   **ADDRESS:** Mansehra

CHIEF COMPLAINTS

- Nausea

- Vomiting

- Satiety (10-12) days

- Cough

- Body pain

- Weight loss (2 month rapidly)

PAST MEDICAL HISTORY

- NILL

FAMILY HISTORY

- Mother and sister are diabetic

INVESTIGATIONS

Date	Test	Results	Normal range
07/10/23	CBC	WBC: 14.2×10.e3/μl	4-11 ×10.e3/μl
		RBC: 5.67×10.e6/μl	4-6 ×10.e6/μl
		HGB: 10.6 g/dl	1.5-17.5 g/dl
	Clinical chemistry	Sodium: 137 mmol/L	13-150 mmol/L
		Potassium: 42 mmol	3.5-5.1 mmol/L
		Chloride:87.9 mmol/L	96-112 mmol/L
		T.billirubin:0.46 mmol/L	0.1-1.0 mmol/L
		Blood urea:24 mmol/L	18-45 mmol/L
		ALT/GPT:35 mmol	10-50 mmol/L
		Alk.Phosphatase:185U/L	40-129 U/L
		Creatinine:0.99 mg/dl	0.64-1.2 mg/dl
	FBS	234 mg/dl	70-100 mg/dl
	CRP	15 mg/dl	<6.0 mg/dl
	HBA1C	11.5%	4.27-6.5 %

DIAGNOSIS

- Type 2 diabetes mellitus

- Left diabetic foot ulcer

MEDICINES TAKEN BEFORE ADMISSION

- Humulin 70/30

- Tab Rast 10 mg

- Tab Ascard 75 mg

- Tab Glucophage 500 mg

TREATMENT AT WARD LEVEL

Date	Medicine trade name	Generic name	Strength	Signa
08/10/23	Inj. Tanzo	Piperacillin+ tazobactam	4.5 g	TDS
	Inf. Flygel	Metronidazole	500 mg/100 ml	BD
	Inj. Hummulin 20+0 16+0	Insulin	70/30	BD
	Tab. Rast	Rosuvastatin	10 mg	OD
	Tab. Ascard	Aspirin	75 mg	OD
	Tab. Glucophage XR	Metformin	750 mg	BD

TREATMENT FOR HOME

Date	Medicine's trade name	Generic name	Strength	Signa
10/10/23	Inj. Hummulin 20+0 16+0	Insulin	70/30	BD
	Tab. Rast	Rosuvastatin	10 mg	OD
	Tab. Ascard	Aspirin	75 mg	OD
	Tab. Glucophage	Metformin	750 mg	BD

SIDE EFFECTS

- Vomiting

DRUG INTERACTIONS

Metformin + Humulin 70/30:A moderate interaction was found, Coadministration of metformin with an insulin secretagogue (e.g. sulfonylurea, meglitinide)or insulin may potentiate the risk of hypoglycemia. [6]

Aspirin + Humulin 70/30: A moderate interaction was found, aspirin increase the effects of insulin by pharmacodynamic synergism. Coadministration of insulin with high doses of salicylates (3g/day) may increase risk for hypoglycemia insulin dose adjustment and increased frequency of glucose monitoring may be required.[7]

REFRENCE: Drugs.com [6],[7]

Piperacillin + Aspirin: Either increased effect of the other drugs by receptor binding competition. salicylic acid could be displaced from protein binding sites or it could itself displace other protein bound drugs and result in an enhanced effect of the displaced drug.[8]

REFERENCE: WebMD, Medscape[8]

COMPLIANCE

Patients show good response to therapy.

CASE NO. 6

PATIENT'S NAME: Husanara   **AGE:** 62year

GENDER: Female   **WARD:** Medical

BED NO: 18   **DATE OF ADMISSION:** 21/05/24

ALLERGIES: Nil   **ADDRESS:** Attock

CHIEF COMPLAINTS

- Constipation
- Deterioration of vision
- Neck swelling
- HTN
- Vomiting
- Weight lose

- Sweating
- Palpitation
- Numbness of both legs

PAST MEDICAL HISTORY

- Nil

FAMILY HISTORY

- One sister diabetic

INVESTIGATIONS

Date	Test	Results	Normal range
21/10/23	CBC	WBC: $9.2\times10.e3/\mu l$	4–$11 \times10.e3/\mu l$
		RBC: $2.79\times10.e6/\mu l$	4–$6 \times10.e6/\mu l$
		HGB: 7g/dl	1.5-17.5 g/dl
		HCT: 21.7%	36-54 %
		MCV: 77.8FL	76-9 FL
		MCH: 25.1Pg	27-33 Pg
		MCHC: 32.3 mg/dl	33-35 mg/dl
		PLT: $253\times10.e3/\mu l$	150-450 $\times10.e3/\mu l$
	Clinical chemistry	Sodium: 136 mmol/L	13-150 mmol/L
		Potassium:4.97 mmol/L	3.5-5.1 mmol/L
		Chloride:103.5 mmol/L	96-112 mmol/L
		T.billirubin:0.21 mmol/L	0.1-1.0 mmol/L
		Blood urea: 46 mmol/L	18-45 mmol/L
		ALT/GPT: 11U/L	10-50 mmol/L
		Alk.Phosphatase:144U/L	40-129 U/L
		Creatinine: 1.51 mg/dl	0.64-1.2 mg/dl
	FBS	197 mg/dl	70-140 mg/dl
	HbA1C	11%	4.27-6.5%
	CRP	12.11 mg/dl	<6.0 mg/dl

DIAGNOSIS

- Type 2 diabetes mellitus
- RDFU (Right Diabetic Foot Ulcer)

MEDICINES TAKEN BEFORE ADMISSION

- Inj Insulin 70/30

TREATMENT AT WARD LEVEL

Date	Medicine trade name	Generic name	Strength	Signa
21/10/23	Inj Augmentin	Amoxycillin/Clavulanic Acid	1.2g	TDS
	Inj Humulin 16 morning 8 evening	Insulin	70/30	BD
	Tab Rast	Rosuvastatin	10 mg	OD
	Tab Glucophage	Metformin	500 mg	BD
	Tab Xilica	Pregabalin	75 mg	OD

TREATMENT FOR HOME

Date	Medicine's trade name	Generic name	Strength	Signa
23/10/23	Inj Humulin 16 morning 8 evening	Insulin	70/30	BD
	Tab Xilica	Pregabalin	75 mg	OD
	Tab Ascard	Aspirin	75 mg	OD

SIDE EFFECTS

- Nausea
- vomiting
- Diarrhea

DRUG INTERACTIONS

Metformin+ Insulin: A moderate interaction may cause hypoglycemia by pharmacodynamic synergism, Antidiabetic are often used in combination, dosage adjustment may be required when initiating or discontinuing antidiabetic effect.[9]

Aspirin +Insulin: A moderate interaction was found, Aspirin increase the effects of insulin by pharmacodynamic synergism. Coadministration of insulin with high doses of salicylates (3g/day) may increase risk for hypoglycemia insulin dose adjustment and increased frequency of glucose monitoring may be needed.[10]

REFERENCE: Drugs.com [9],[10]

COMPLIANCE

Patients shows good compliance to therapy

STATISTICAL INTERPRETATION

The study was conducted from April 2024 to May 2024. Prevalence of disease among male and female and different age groups were determined. With the detailed study of patient condition, therapy related problems, treated and untreated condition of patient were also observed.

GENDER WISE PREVALENCE OF DIABETES

Case histories of the selected patient having diabetes admitted in hospital were divided into two groups on the basis of gender, such as Group A (Male), Group B (Female). The study showed that 2 patients were male while 4 patients of diabetes were female. Frequency and percentage of diabetes in gender distribution among case histories is given in table

GENDER WISE PREVALENCE OF DIABETES

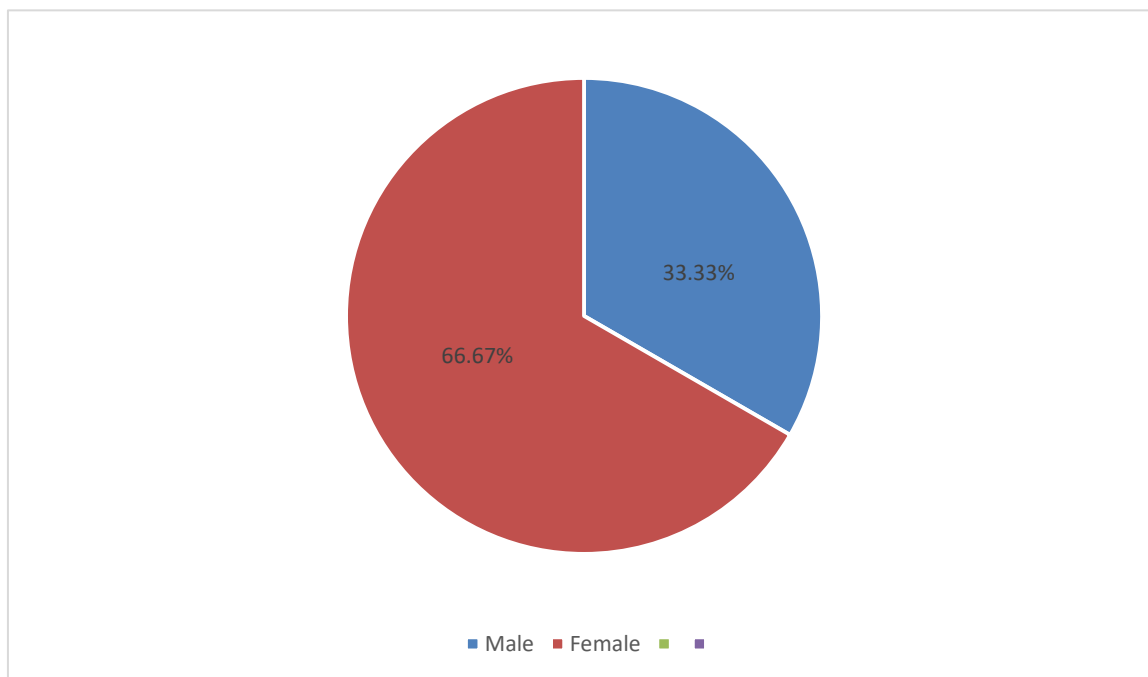| 1	Male	2	33.33%
2	Female	4	66.67%
3	Total	6	100%

FIGURE 1.1

As seen by the data female patients are more in number who have been affected by diabetes as compared to male patients.

FREQUENCY DISTRIBUTION OF DIABETES ACCORDING TO AGE

Here the cases of patients are divided according to the age, divided into 7 groups in which the patients are distributed from age 0 to age 70

FREQUENCY DISTRIBUTION OF DIABETES ACCORDING TO AGE

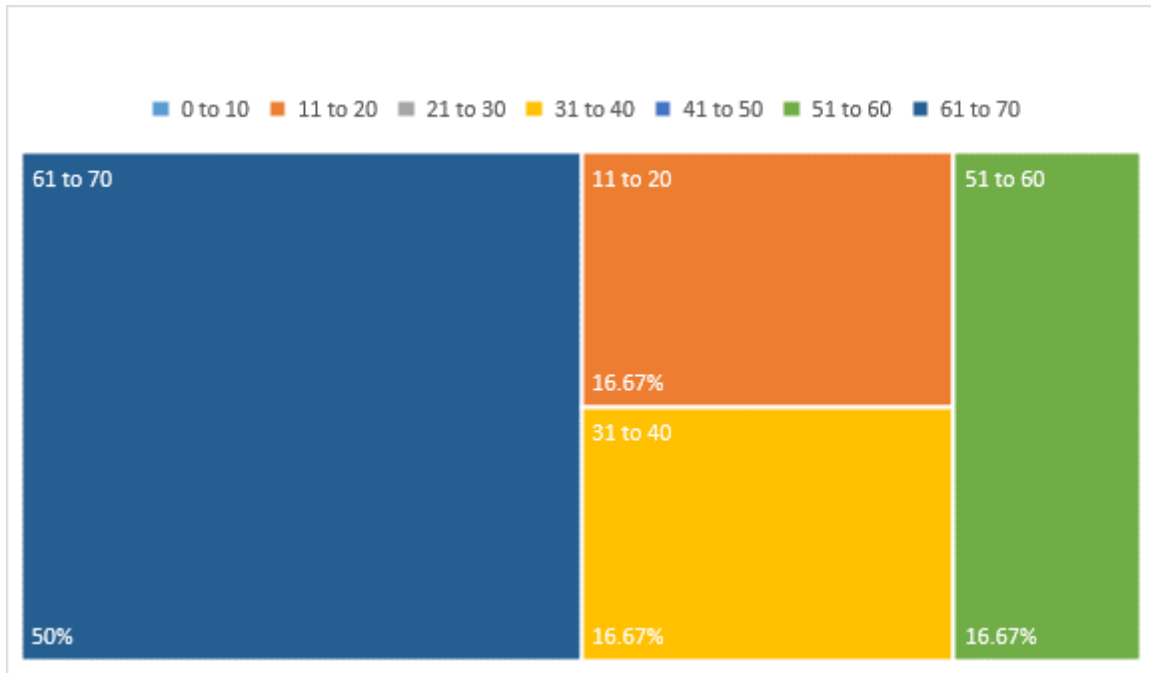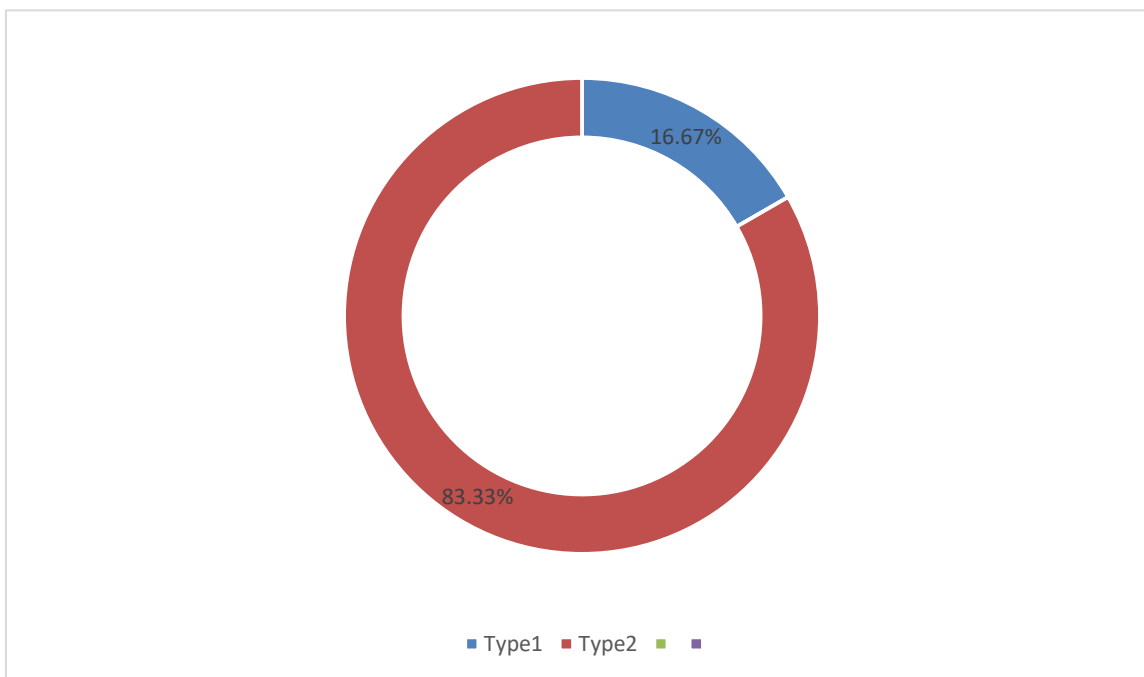| Sr No	Age group	NO	Percentage
1	0 to 10	0	0%
2	11 to 20	1	16.67%
3	21 to 30	0	0%
4	31 to 40	1	16.67%
5	41 to 50	0	0%
6	51 to 60	1	16.67%
7	61 to 70	3	50%

FIGURE 1.2

According to age as seen by the data, disease is more prevalent in patients of age 61-70years.

PERCENTAGE OF TYPE OF DIABETES MELLITUS (TYPE 1 AND TYPE 2)

Type 1 DM   1   **% of Type 1 DM**   16.67

Type 2 DM   5   **% of Type 2 DM**   83.33

PERCENTAGE OF TYPE OF DIABETES MELLITUS (TYPE 1 AND TYPE 2)

From all cases collected, it was observed that only 1 (16.67 %) patients are suffering from type 1 diabetes mellitus while 5 (83.33%) are suffering from type 2 Diabetes mellitus

TYPES OF INTERACTION ON THE BASIS OF SEVERITY

Total number of interactions in all patients prescription were 8 all of which were moderate interactions, There were no minor and major drug interaction interactions.

TYPES OF INTERACTION ON THE BASIS OF SEVERITY

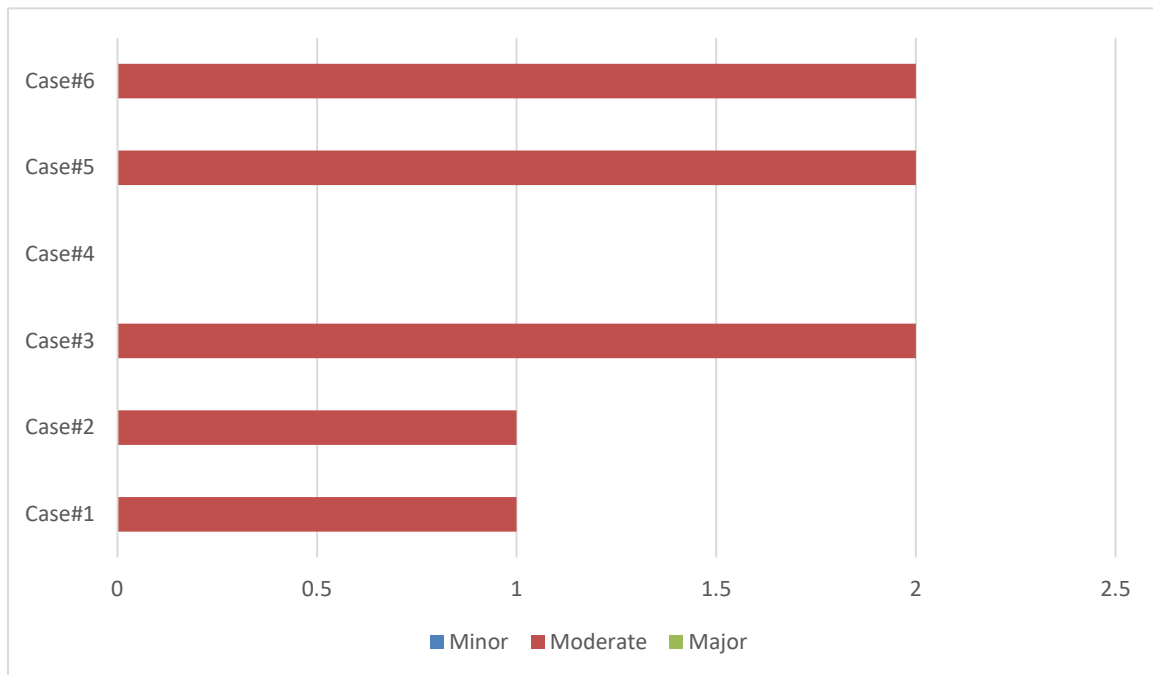| Case No	Minor	Moderate	Major	Total
1	0	1	0	1
2	0	1	0	1
3	0	2	0	2
4	0	0	0	0
5	0	2	0	2
6	0	2	0	2
Total	0	6	0	6

FIGURE 1.3

MEDICINE USED BY PATIENTS BEFORE HOSPITALIZATION FOR DIABETES MANAGEMENT

Case No	Medicine
1	Humulin 70/30
2	Glimepiride
3	Metformin
4	Humulin 70/30
5	Humulin 70/30, Metformin
6	Humulin 70/30

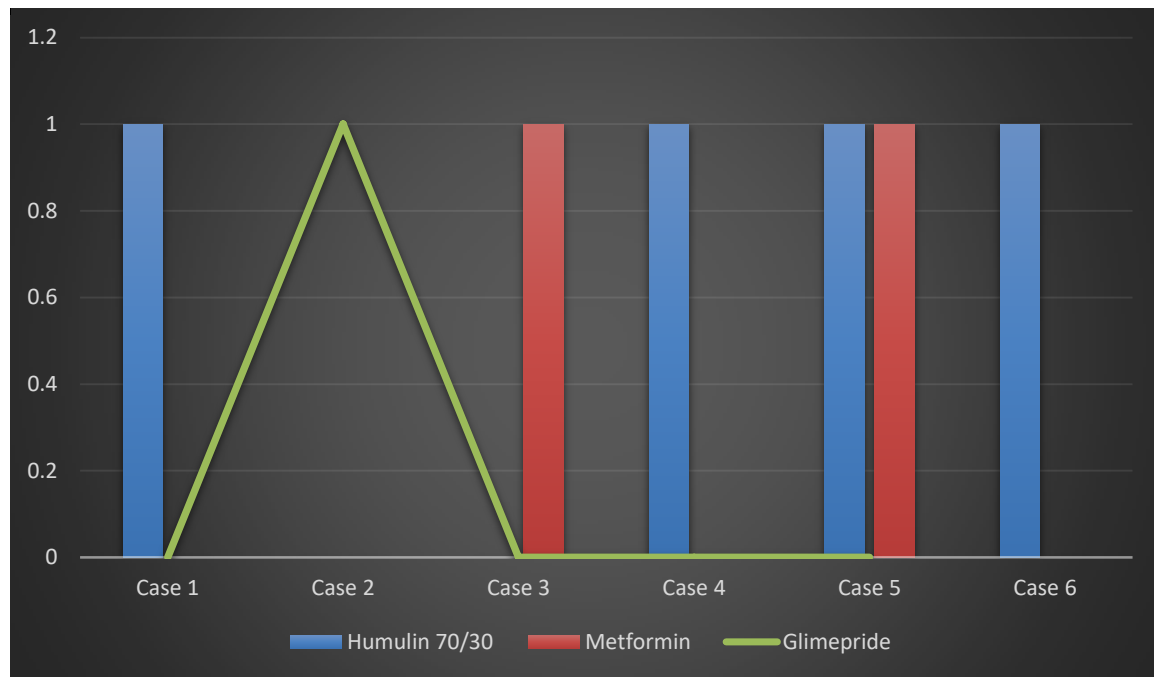**MEDICINE USED BY PATIENTS BEFORE HOSPITALIZATION FOR DIABETES MANAGEMENT**

FIGURE 1.4

It was observed that 3 Patients were on Humulin 70/30 theraphy, 1 Patient was on Metformin and 1 was on Glimepiride while 1 Patient was on combination theraphy of Humulin 70/30 and Metformin.

NUMBER OF MEDICATION PROVIDED AT DISCHARGE FROM HOSPITAL

Case No	List of Medication provided	No. of Medications
1	Metformin, Humulin 70/30	2
2	Sevelamir, Repaglinide, Furosemide, Esomeperazole, Candesartan, Locasamide	6
3	Humulin 70/30, Metformin, Sulbactum/cefoperazone, Guaifenesin, Esomeprazole	5
4	Humulin 70/30, Amoxicillin/clavulanate	2
5	Humulin 70/30, Rosuvastatin, Aspirin, Metformin	4

From the medical record we observed that Humulin 70/30 is mostly prescribed for the treatment and management of diabetes followed by Metformin.

CONCLUSION

After collection and details analysis of case histories it was observed that Diabetes Mellitus prevalence in Male population is 33.33% while in Female it is more prevalent with 66.67%, In age wise distribution only one patient was type 1 diabetic with age below 20 years account for 16.67% while 5 were type 2 Diabetic patient with 83.33% in total of 6 case histories, overall Diabetes Mellitus specifically Type 2 is more prevalent in age group between 61 to 70 years of age. DRPs specifically Drug interactions were mostly Moderate account for 100% as no major and minor interactions were identified with reference to Medscape, WebMD and Drugs.com, Medications used by patient before hospitalization for Diabetes management include Humulin 70/30 for 3 Patients, Metformin for 1 patient, Glimepiride for 1 patient while combination theraphy of Humulin 70/30 and Metformin was used for 1 patient. Detail analysis indicate that out of 6 patient only 1 patient has good glycemic control with RBS 90mg/dl and HbA1C 7.6%, while rest of 5 patients has their HbA1C value above 10%, there FBS and RBS were also elevated to abnormal level. Out of total 6, 2 patients show poor compliance while 4 patient has shown good compliance to therapy and Physician advise. Hypertension and Chronic Kidney Disease were identified as Co-morbid condition, complications of Diabetes Mellitus include Diabetic Foot Ulcer, Diabetic Neuropathy. As it was concluded that the main frequently occurred DRPs was drug interactions, which is the most important point, while prescribing drugs is the main cause of morbidity and mortality. In order to provide safe, effective, appropriate and cost-effective therapy to the individual patients and whole community, it can be concluded that mutual interaction between Physician, Surgeon, other health Care professionals and Clinical Pharmacist is time necessary which will assure rational medication therapy and the desired outcomes i.e. Positive response to therapy of each and every patient. Patient's education and counseling plays an important role in patient compliance and it is the duty of pharmacist to educate and counsel their patient about his/her medications dose, frequency, duration. Dosage form, route of administration and potential adverse effects and also educate the patient to consult the physician in case of any adverse effects. Drug interaction should be kept in mind

while prescribing medications. The dose adjustment of certain drugs should be done in case of hepatic and renal impairment in order to minimize the adverse effects and hence morbidity and mortality. There must be accurate supervision and management of narrow therapeutic drugs by pharmacist.

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