A PROSPECTIVE STUDY ON PRESCRIBING PATTERN AND DRUG-INTERACTIONS IN TYPE 2 DIABETES PATIENTS WITH COMORBID CARDIO COMPLICATIONS IN A TEACHING HOSPITAL

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ABSTRACT

The study involves screening the prescription trends in type 2 diabetes mellitus patients with comorbid complications imposed with diabetes. However study was undertaken in the Oxford medical college and hospital Bangalore, to evaluate prevalence rate of type II diabetes mellitus in males and females as well drug–drug interactions comprise to be potential & actual appropriateness which deserve clinical attention and choice of prescribing pattern promoting rational use of medications. The study was Simple Prospective observational study which was carried out for a period of six months 200 cases were collected in the study which determines number of OADDS therapy were administered for type II DM patients ruling out generic or essential drug prescribing, monitoring prominent drug interactions, drug safety management. The results were analyzed Maximum numbers of patients were in the age group of above 60 years (95.70%) and among 200 cases, males constituted 106 (57%) and females 94 (47%). Out of 200 patients 112 patients (66.27%) patients were found suffering with co morbid concurrent illness hypertension followed by cardio complications associated (HTN-IHD, HTN-CAD, OTHER COMORBIDITIES). Essentially assessment of therapy and management of disease with combination therapies of insulin and different oral anti-diabetic drugs were prescribed for proper glycemic control. As well clinical attention on drug interactions by clinical pharmacist interventions indicates clinical effectiveness of therapy is
influenced by prescribed agent selection and therapy changes as well patient’s adherence with drug regimens.

**KEYWORDS:** Prescribing pattern, rational therapy, Drug interactions, Generic use, Comorbidity.

**INTRODUCTION**
Drug utilization study, is a process which is used to assess the choice of drug therapy and patient drug use in a given health care environment, Drug utilization studies seek to monitor, evaluate and implement remedies in the prescribing practice with the aim of making the medical care rational and effective. A study of prescription pattern is to determine rational drug therapy. Prescribing Guidelines in review of prescription patterns (according to W. H. O) provide attempts to analyze treatment options in type 2 D. M. patients with comorbid concurrent illness. However Type 2 diabetes is more often and significantly estimates were 90% of all diabetes cases worldwide. It occurs most frequently in adults even observed increasingly in adolescents. WHO has estimated that, 31.7 million individuals on average affected by diabetes in India.

**The goal of management in people with diabetes is to provide.**
- Relief from diabetic symptoms and improve quality of life.
- Prevention of acute complications, Prevention of infections. The compliance of people with diabetes management covers treatment as well educating programs include.
- A positive attitude
- Appropriate self-care skills.
- In depth information about diabetes its complications and treatment.
- Appropriate resources of self-care.
- Self-monitoring skills.

Hence the present study was carried out on OHAs (anti-diabetic drug) relevantly describe the prescribing pattern, but the use of insulin preparations in the treating Type 2 diabetes mellitus in achieving optimal glycemic tolerance, the effectiveness of the anti-diabetic drugs was only 41%; therefore an outlook on current drug treatment as well multiple drug interventions with lifestyle modification is necessary.\textsuperscript{[1]}
**Purpose of drug use indicators**
Objective measures of drug use that can describe situation in a health facility. These indicators will allow health planners, to make comparisons between situations in correlating proper guidelines. The indicators assess the impact of the interventions undertaken in a proper therapeutic plan. The indicators detect problems in performance of individual providers or Health facilities. The drug use indicators enumerate further questioning and to guide subsequent action in altering the therapy for precise outcomes.

**Types of drug use indicators**
Indicators are developed use as measures of performance in specific areas, related to the rational use of Drugs. Prescribing practices by clinical consultation and pharmaceutical dispensing. Facility of specific factors which support RUD these are no less important, often more different measure were cannot be collected accurate in some areas. These could be less precise and may depend on local variables.

**Prescribing indicators**
Prescribing indicators mostly screen ratio of drug regimen proportion in this way, hence estimates.
Average number of drugs per encountered.
Percentage of drugs prescribed by generic name,
Encounters of antibiotics prescribed, ratio of injection prescribed, drugs prescribed from essential drug list or formulary.

**Patient care indicators**
Essentially studies on patient.
Average consultation time for each individual.
Average dispensing time estimating proportion of drugs actually dispensed to the illness of patient.
Percentage of drugs adequately labeled to patients knowledge of correct dosage.

**Facility indicators**
Availability of essential drug list. These indicators meant to describe practices in a selective sample of health facilities. The prescribing indicators can be based on either Retrospective as well prospective data. Retrospective data evaluates the drug use during patient previously in the past can be collected accordingly based on study. A Prospective data describes the drug
use during patient visits. These indicators represent measures of performance that can be used in addition to the core indicators are sort of considering appropriate choice of drug use.[2]

**Drug interactions**

Drug interaction in our study essentially monitored as collective source to check complete transition of affects to patient on use of medications, (Synergistic effect; increase in effect. Antagonist effect; decrease in effect or new effect.) It explains a situation in which a substance usually another drug affects the activity of a drug when both administered. Drug interactions are more common in type 2 diabetes mellitus; hence require clinical attention to rule out severity of reactions.

Ex: 1. Aspirin + insulin result in hypoglycemia, seizure.
2. Feno fibrate + glimepiride result in hypoglycemia.
   - There is much overlap of medications interact with oral diabetes drugs include
   - Heart medications
   - Decongestants
   - Antibiotics
   - Thiazide
   - Steroids
   - Oral contraceptives
   - Seizure medications
   - Psychiatric medications

Use of more than one diabetes medication can cause hypoglycemia. Beta-blocker medications can mask the symptoms of hypoglycemia. Glimepiride effects do occur in patients with history of heart failure increasing fast heartbeat. Use of Meglitinides may cause hypoglycemia, also metformin induce hypoglycemia, and derivatives of Thiazolidinedione may cause or exacerbate heart failure. Pioglitazone has history of heart failure increasing fast heartbeat. Alpha-glycosidase inhibitors should be avoided in people with intestinal diseases such as inflammatory bowel disease or intestinal obstruction. Drug effects resulting from pharmacokinetics, as well as pharmacodynamics factors minimizing the risk involved. Health care providers should take responsibility for the safe prescribing of medications intending rational use of drugs (RUD) should be ensured by system...
of prescribing, dispensing medications. Monitoring, reporting adverse drug reactions carried out to ensure safety of drugs on use.

Most uncommon causes of diabetes (1% to 2% of cases) include endocrine disorders like (acromegaly, Cushing’s disease), gestational diabetes mellitus (GDM), effects of exocrine pancreas (e.g., pancreatitis), and drug regimens (e.g., glucocorticoids, pentamidine, niacin. Type II D. M., called non-insulin dependent diabetes, is the common form of diabetes, affecting 90 % to 95 % of population which are chiefly associated with insulin resistance syndrome. Gaining insight into physician’s pattern in order to identify prescribing problem ensures proper measures in improving quality of prescription and patient care. Therefore, the present study is to understand the prescription pattern.[3]

**Role of oral hypoglycemic Agents and insulin in therapy**

Considering the importance of the safety in diabetic patient emphasis present study use of OHAs still dominate the prescribing pattern, but there was a trend toward the use of insulin preparations in treating Type 2 diabetes mellitus. Insulin is two chain polypeptide having 51 amino acids. The peptide hormones directly involved in responding to control blood glucose level and located in the islets of Langerhans in pancreas; insulin secretion regulated by β-cells and glucagon by α2-cells. The 51 AA in two chains connected by 2 disulphide bridges, a single gene product cleaved into two chins during post translational modifications. Therapeutic half-life (t1/2:5-10 minutes degraded by glutathione insulin Tran’s dehydrogenase (insulinase) which cleaves disulphide links. General types of insulin differ physiologically, (bovine differs 3AAs, and pork insulin differs 1AA. Insulin is stored in a complex with Zn+2 ions, Episodes of both hyper and hypo glycaemia treated with insulin average doses indication where absolute auto immune destruction of β-cells mediated by T cells process and humoral mediators (TNF, L-1, NO). Insulin acts by binding to specific receptors. Insulin receptor is a glycoprotein made up of two α and two β subunits. Insulin receptors are present on almost all cells in body. Insulin binds to these receptors on surface of the target cells. Phosphorylation and de-phosphorylation reactions which stimulate or inhibit the enzyme involved in metabolic actions of insulin. These bindings stimulate tyrosine kinase activity in the β subunit.[4]

**Factors regulating insulin**

The synthesis and release of insulin action is regulated by Glucose, AAs, FAs & ketone bodies. Glucagon & somatostatins inhibit release. An adrenergic stimulation inhibits release
(most important). Concomitantly β adrenergic activity promotes release of Elevated intracellular calcium promotes release. Insulin is metabolized in liver and kidney. The secretion is regulated by factors like food, hormones, and autonomic nervous system. Hypokalemia inhibit insulin release blood glucose concentration is the main factor.

Glucose transporters—are proteins present in different tissues. They are of 5 subtypes – GLUT1 to GLUT5. They mediate various functions for example – GLUT 4 present in muscle and adipose tissue promotes uptake of glucose.\[^5\]

**Diabetic complications**
Complications associated with diabetes could be long term and hence described as long term complications.
Macro vascular includes: coronary, cerebrovascular and peripheral vascular lead to pain, chronic stages ultimately leading to gangrene and amputation.
Co-existence of HTN and DM increases cardiovascular disease, double the risk of cardiovascular death, stroke ischemic events in DM individuals.
Eye diseases: diabetes retinopathy with detectable major consequences of complicated changes in proliferative and non-proliferative retinopathy.
Diabetic nephropathy: renal failure occurs in 20-30% of patients with type 2 DM.
Diabetic neuropathies: peripheral neuropathy sensory motor nervous system is affected induces severe neurological abnormalities.
Certainly Foot, skin and mucous membrane complications: stem from alterations in nerves that control blood flow and skin hydration.

**Implications of essential drug use**
Essential drugs comprise regimens needed to overcome ill health. By increasing access to essential drugs and their rational use, this could improve health. “Essential drugs meet the health care needs of the patient; they should therefore be available at all times in the appropriate dosage forms”. Implicates the positive impacts of drugs on health.\[^6\]

**METHODS**

*Study area and data collection process*

The study was conducted at department of general medicine, oxford medical college and research center, Bangalore. A prospective observational study at department of general medicine, oxford medical center and hospital in Bangalore, In this study, 200 cases were
collected in which describing the selection therapy and drugs were administered for type II diabetes mellitus as well choice ascertained to concurrent illness. The patients were involved in the study based on inclusion and exclusion criteria. In this study, the type of OAADS mostly administered to patients whether single or in combination triple therapy was evaluated ascertaining gender, age of the patient, type of OADDS and co morbid concurrent illness with relevancy were studied. However it collectively notifies the chance of actual and potential drug interactions of drugs essentially severe. The results were analyzed.\(^7\)

**Inclusion criteria**

Type 2 diabetes (m & f patients)
Age>18years
Hospitalized for complications like macro vascular (coronary artery disease, HTN, peripheral vascular disease). History of heart failure, myocardial infarction, coronary revascularization (coronary artery bypass graft surgery), or stroke in the last 6 months.

**Exclusion criteria**

1) Patients age below 18 years 2) Gestational diabetic patient population 3) Juvenile D.M patients.

**Study parameters**

General prescription pattern Each indicator analyzed by using the following drug indicators suggested by the WHO to evaluate the drug prescription pattern:

a. Number of drugs in the prescription.

b. Average number of drugs per prescription.

c. Average of drugs prescribed by generic name.

d. Average of prescriptions with OADDS prescribed.

e. Estimate of prescriptions with injectable preparations.\(^8\)

**Data collecting method**

The study was conducted on the basis of patient perspective and is a sort of prevalence based study.

The medical history consisting of inpatient medical records are reviewed for specific period of time.

Data recorded as patient demographic characteristics, clinical status duration of disease, type of complication, length of stay.
Data analysis process
The data includes demographic variables, date, and name of medication, dosage forms, doses and frequency. The drug-drug interactions were checked using Medscape drug interaction checker. Descriptive statistics like frequency and other parameters were computed to determine the overall prevalence. The procedure completed with consent of authorities of the concerned institutions and confidentiality of the prescriptions was maintained strictly. The specific types of data necessary to measure the prescribing pattern were recorded for each patient encountered.

Plan of work
- Collection and review of literature pertaining to the project.
- Preparing study protocol including study design, design of proforma.
- Enrolment of patients according to the inclusion and exclusion criteria.
- Collection of patient details.
- Interpretation of data.
- Analyzing the data.
- Submission of report.

RESULTS
In this study 200 cases involving O. H. As administration were included. Table 1 gives demographic characteristics of patients to whom O. H. As were administered based on age and gender. Maximum number of patients were in the age group of 60 years above (95.70%) and among 200 cases, males constituted 106 (57%) and females 94 (47%).

![Patient Age wise distribution](image)

Fig. 1: Patient Age wise distribution
**Percentage of age wise distribution**

The study enumerates demographic distribution of number of patient’s male, female in percentage according to age wise.

![Percentage age wise distribution](image)

**Fig. 2: Percentage age wise distribution**

**Sex wise distribution**

Implicative of gender wise distribution estimates to proper interpretation of study demographics.\(^9\)

![Sex wise distribution](image)

**Fig. 3: Sex wise distribution**

**Comorbid illness distribution**

The study emphasis the exact count of patients with respective comorbid illness along with diabetes.

![Comorbid illness distribution](image)
Out of 200 patients 112 patients (66.27%) patients were found suffering with co morbid concurrent illness hypertension followed by cardio complications associated (HTN-IHD, HTN-CAD, OTHER COMORBIDITIES).[10]

Table 1: Pattern of prescribing details in diabetic patients.

<table>
<thead>
<tr>
<th>Details of prescription</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of prescription analyzed</td>
<td>200</td>
</tr>
<tr>
<td>Total no. of drugs prescribed</td>
<td>1287</td>
</tr>
<tr>
<td>Avg. no. of drugs per prescription</td>
<td>6.43%</td>
</tr>
<tr>
<td>No. of drugs from WHO essential drug list out of total no. of drugs prescribed</td>
<td>581 (90.35%)</td>
</tr>
<tr>
<td>No. of drugs prescribed by generic name out of total no. of drugs prescribed</td>
<td>30 (2.33%)</td>
</tr>
<tr>
<td>No. of encounters with antibiotics prescribed</td>
<td>49 (3.80%)</td>
</tr>
</tbody>
</table>
The prescription were analyzed estimates of 1287 drugs prescribed to the type II DM patients in our study, 1257 drugs were prescribed by their brand names. Average number of drugs per prescription 6.43%. As well prescriptions included antibiotics 49(3.80%), injections (140 10.87%).

Table 2: Anti-diabetic prescription pattern

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Total number of prescriptions</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mono therapy</strong></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>O. H. As used</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Biguanides (metformin)</td>
<td>30</td>
<td>15%</td>
</tr>
<tr>
<td>Sulfonylureas (glimepiride)</td>
<td>07</td>
<td>3.5%</td>
</tr>
<tr>
<td>Sulfonylureas (glipizide)</td>
<td>03</td>
<td>1.5%</td>
</tr>
<tr>
<td>Meglitinides (Repaglinide)</td>
<td>02</td>
<td>1%</td>
</tr>
<tr>
<td>Alpha-glycosidase (voglibose)</td>
<td>04</td>
<td>2%</td>
</tr>
<tr>
<td>Insulin</td>
<td>53</td>
<td>26.5%</td>
</tr>
<tr>
<td><strong>Dual therapy</strong></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>O. H. As</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Metformin + Glimepiride</td>
<td>36</td>
<td>18.12%</td>
</tr>
<tr>
<td>Insulin + Metformin</td>
<td>10</td>
<td>5%</td>
</tr>
<tr>
<td>Insulin + Glipizide</td>
<td>03</td>
<td>1.5%</td>
</tr>
<tr>
<td>Insulin + Glimepiride</td>
<td>04</td>
<td>2%</td>
</tr>
<tr>
<td>Metformin + Glipizide</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Metformin + Dpp4 (sitagliptin)</td>
<td>04</td>
<td>2%</td>
</tr>
<tr>
<td>Metformin + Glibenclamide</td>
<td>08</td>
<td>4%</td>
</tr>
<tr>
<td><strong>Triple therapy</strong></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>O.H.As</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Insulin + Metformin + Glimepiride</td>
<td>03</td>
<td>1.5%</td>
</tr>
<tr>
<td>Glimipride + Metformin + Pioglitazone</td>
<td>03</td>
<td>1.5%</td>
</tr>
<tr>
<td>Insulin + Metformin + Glipizide</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>Insulin + Metformin + Repaglinide + Sitagliptin</td>
<td>02</td>
<td>1%</td>
</tr>
</tbody>
</table>

No. of injections out of total no. of drugs prescribed. 140 (10.87%)
Total no. of anti-diabetic drugs out of total no. of drugs prescribed. 344 (26.90%)
Anti-diabetic drug prescribing pattern

The percentage of patients on anti-diabetic monotherapy (99, 49.5%), dual-therapy (79, 39.5%), triple therapy (22, 11%) fig. 5.

The study reveals that human insulin preparation is the most prescribed 53 patients (26.5%). Among the drug combination 36 patients received Glimipride + Metformin combination (18.12%) followed by Insulin + Metformin (10, 5%), Insulin + Glipizide (3, 1.5%) Insulin + Glimepiride (4, 2%) Metformin + Glipizide( 14, 7%) Metformin + Sitagliptin (4, 2%).

Respectively 5 triple therapy combination of O.H.As were analyzed as such Insulin + Metformin + Glimepiride (3, 1.5%), Glimepiride + Metformin + Pioglitazone (3, 1.5%). Insulin + Metformin + Sitagliptin (2, 1%) Insulin + Metformin + Glipizide (14, 7%) in table 2.[11]

Table 3: Possible drug – drug interactions on use with OADDS

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Interaction</th>
<th>Frequency</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Insulin-ACE Inhibitors</td>
<td>4</td>
<td>May result in increased risk of hypoglycemia.</td>
</tr>
<tr>
<td>2</td>
<td>Sulfonylureas-NSAIDs’</td>
<td>5</td>
<td>May result in an increased risk of hypoglycemia.</td>
</tr>
<tr>
<td>3</td>
<td>Aspirin-Nitroglycerin</td>
<td>3</td>
<td>May result in an increase in nitroglycerin concen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>trations and additive platelet function depression.</td>
</tr>
<tr>
<td>4</td>
<td>Fluoroquinolones-Antidiabetic Agents</td>
<td>3</td>
<td>Increased risk of hypoglycemia or hyperglycemia</td>
</tr>
<tr>
<td>5</td>
<td>Quinidine-Metformin</td>
<td>1</td>
<td>May result in an increase in metformin plasma</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>concentrations.</td>
</tr>
<tr>
<td>6</td>
<td>Quinine-Metformin</td>
<td>2</td>
<td>May result in an increase in metformin</td>
</tr>
</tbody>
</table>
Minimizing the risk for drug interactions should be a goal in drug therapy because interactions can result in significant mortality. Health care providers should take responsibility in prescribing of medications ensuring safety, but we often discuss potential adverse drug reactions not drug interactions with patients. We may overlook adequately because there are rarely quick, easily accessible, and comprehensive resources that cover drug interactions. Drug interactions resulting from absorption, distribution, metabolism, or elimination, as well as pharmacodynamics factors, are present for many common medications given to people with diabetes. Diabetes educators should be active team members in screening, educating, and following up on suspected drug interactions risk of adverse effects. Promoting improved quality of life for people with diabetes.

Table 4: Common diabetes, hypertensive drug interactions

<table>
<thead>
<tr>
<th>Medication</th>
<th>Drug-Drug Interaction</th>
<th>Drug-Nutrient Interaction</th>
<th>Drug-Disease Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfonylureas</td>
<td>Inhibitors/inducers of CYP2C9</td>
<td>Alcohol: first-generation sulfonylureas may cause flushing reaction, severe nausea/vomiting</td>
<td>Metabolized: Liver/Kidney Caution If Dysfunction ADR: Loss Of Efficacy Or Hypoglycemia</td>
</tr>
<tr>
<td>Meglitinides</td>
<td>Nateglinide none Repaglinide</td>
<td>None</td>
<td>Liver dysfunction: caution with both agents ADR: loss of efficacy or hypoglycemia</td>
</tr>
<tr>
<td>Metformin</td>
<td>Cimetidine may compete with metformin for renal elimination, which may increase levels of metformin</td>
<td>Vitamin B12 depletion; periodic monitoring if at risk</td>
<td>Lactic acidosis: renal insufficiency and hypoxic states (congestive heart failure, surgery, shock, or liver disease, including alcohol intake) ADR: hospitalization/death</td>
</tr>
<tr>
<td>TZDs</td>
<td>Strong inducers/inhibitors of CYP2C8 Clinical effect of</td>
<td>None</td>
<td>Fluid retention ADR: peripheral edema, heart</td>
</tr>
<tr>
<td>Interaction</td>
<td>Notes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Failure, pulmonary edema</td>
<td>ALT $\geq 3$ upper normal limits: do not start therapy; stop if taking.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>α-Glycosidase inhibitors</td>
<td>May decrease digoxin absorption; May increase effect of warfarin. Action: space administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exenatide</td>
<td>May slow absorption of medications: caution if rapid adsorption needed (e.g., acetaminophen, pain meds)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACE inhibitors, ARBs</td>
<td>Captopril: CYP2D6, Enalapril: CYP3A4. Aspirin, NSAIDs: may reduce antihypertensive effects of ACE inhibitor. Lithium: levels may increase. Caution with potassium supplements with moexipril, captopril, and valsartan. Take 1 hour before or 2 hours after meals.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CCBs</td>
<td>CYP3A4 inducers/inhibitors. Grapefruit juice may increase antihypertensive effects.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diuretics</td>
<td>NSAIDS and phenytoin may reduce effectiveness of loop diuretics. Thiazides may affect lithium levels.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This frequency was low but may cause serious problem because in most of the cases. They are known to produce drug-drug interactions.\(^{[12]}\)

**DISCUSSION**

Diabetes mellitus is seemingly one of the active major non communicable diseases which are growing very fast. The prevalence of diabetes mellitus in this study set up was 12.70%. This found to be in accordance with the study conducted in pune bharati hospital where the prevalence rate found to be 7.94 % on a population study of 125 individuals in urban. Our study shows prevalence of type II DM was high in males of ratio in percentage 57 % (n106). Males have predominance in the study population with the results of various studies in India and United States. The present study indicates administration of OADDs along with comorbid illness drugs treating in the general medicine ward of hospital. Demographic characteristics showed that out of 200 patients, administration of OADDs, to male were 106
(57%) and female were 94 (43%) and the maximum distribution i.e. use of OAADs were administered in the patients between the age group of above 60 years (95.70%) and followed by middle age group 41-60 years (79.34%) and 18-40 years (24.9%). There was high prevalence in elderly age group due to life style habits, obese, physical inactivity, smoking; alcoholism (males) unmask blood sugar to rise.

However the pattern of anti-diabetic drug utilization most common therapy in which the oral anti diabetic drugs prescribed were mono therapy was (49.5%), others, followed by dual therapy (39.5%), triple therapy (11%). Insulin 53 (26.5%), metformin 30 (15%), glimipride 7 (3.5%) glipizide 3 (1.5%) Repaglinide (2%) voglibose 4 (2%). The various combination drugs includes dualtherapy (39.5%). Drug choice enlisted Metformin + glimepiride, 36 (18.12%), Insulin + metformin 10 (5%), Insulin + glipizide 3 (1.5%), Insulin + glimepiride 4 (2%), Metformin + glipizide 14 (7%), Metformin + Dpp4 (sitagliptin) 4 (2%), Metformin + Glibenclamide 8 (4%).

Triple therapy Insulin + metformin + glimepiride:3 (1.5%), Glimipride + metformin + pioglitazone 3 (1.5%), Insulin + metformin + glipizide 14 (7%), Insulin + metformin + repaglinide Sitagliptin 2 (1%).

When cases were screened thoroughly, it was found that numbers of cases of Monotherapy cases were (n-99) and combination therapy cases were (n-101). This shows that prescription suggested for administration was more preferred to be mono-therapy. Among the use of combination therapy drugs in number dual therapy (79), triple therapy (22). In this study a total of 169 patients suffered from certain specific comorbid cardio complications out of 112 hypertension cases accounted for 66.27% of total complication which was lower than in the study reported in Nepal (hypertension accounted for 70.62% of total complication).

The prescription trends were analyzed, out of 1287 prescribed to the type II DM patients, 1257 drugs were prescribed by their brand names. The average number of drugs per prescription is 6.43% which was high compared to other studies it is recognized that patients with diabetes mellitus are generally prescribed more drugs than others. Prescriptions for injections 140 (10.87%) and antibiotics 49 (3.80%). 90.35% of drugs were by their brand names which is higher and 2.33% were prescribed by generic names which lower in the study conducted by Manjusha S et al in department of medicine, Bharati hospital, Poona. While another study conducted by M. Ashok Kumar et al in Tamilnadu reveals that average number
of drugs per prescription, percentage of drugs from WHO essential drug and injections were higher, where as the percentage of anti-diabetics prescribed were found to be lower than study conducted by M. Ashok et al.

Prospective drug utilization study is one of the most effective methods to assess and evaluate the prescribing pattern and help to promote rational use of drugs .in patients with type II DM treatment may be initiated with monotherapy and early intervention with a combination of oral anti-diabetic agents. In our study insulin as a monotherapy secured highest utilization percentage 53(26.5%) among all anti-diabetic drugs .Numerous studies show that a combination of insulin and sulfonylureas is more effective than insulin alone in treatment of type II DM patients .In few patients failure of OAADs allowed to switch over insulin preparations.

Combination of sulfonylureas and metformin were widely used, frequently prescribed ratio (18.12%). Which is comparatively beneficial as a sort of rational suggestion in treatment. Metformin does not promote weight gain and chosen over cardio vascular risk factors. Accordingly metformin is regarded as drug of choice for most patients with type II DM. This study supports 15% received metformin as well combination with other OADDs (18.12%).

In this study the respective drug-drug interactions which were found potential which is comparatively less than the study carried out by M Ashok et al. Finally, the establishment of conventional therapies for management of type II DM for adequate metabolic control should be optimized with intense prescribing modes in accordance to therapy in establishment of therapeutic guidelines; a constant monitoring of diabetic condition of a patient reduces the threat and improves quality of life. It is important to note that drugs should be prescribed in their generic names. Although there are both advantages and disadvantages of generic prescribing, there is more to gain by this practice, especially in a teaching hospital which has a dual responsibility of providing patient service as well improving quality of life.

CONCLUSION
The study has shown that majority of patients with type-II DM were managed insulin Monotherapy [53 patients (26.5%)] as well the current prescribing trends of oral anti-diabetic drugs do achieve adequate optimal glycemic control. However combination therapies of insulin with different oral anti-diabetic drugs were prescribed for proper glycemic control in severe glycemic levels.
Diabetic clinics should be strongly encouraged for optimal glycemic control with mono or dual therapy in order to prevent early emergence of complications that tend to increased morbidity and mortality in these patients. The epidemic rise of diabetic prevalence was gradually high in current years. It need conventional therapies and intense management of type-II DM for adequate metabolic control of blood glucose level should be achieved in prescribing appropriate therapy and newer agents like DPP-IV inhibitors for the management of DM.

The drug-drug interactions deserve clinical attention and management by clinical pharmacist interventions. Advice on most often measure should be taken on substituting or withdrawal of participant drugs.

The results of present study highlights the need for comprehensive management of diabetic patients including life style changes, dietary changes can control hyperglycemia, cardiovascular prevention, treatment of complications, and comorbidity. Clinical effectiveness of therapy is influenced by prescriber agent selection and therapy, as well patients’ adherence with prescribed drug regimens.

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