

ROLE OF CLINICAL PHARMACIST IN PATIENTS WITH DIABETES AND HYPERTENSION: A PROSPECTIVE STUDY

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ABSTRACT

Background: Drug related problems occur commonly in patients who often receive polypharmacy with multiple co-morbid conditions. This constitutes a major health problem because of their negative consequences with increased morbidity and mortality. **OBJECTIVE:** To study the role of clinical pharmacists in hospitalized diabetes mellitus patients with hypertension. **METHODS:** A prospective and active surveillance study on 122 patients was conducted in the department of Aster Prime Hospital over a period of 6 months. The information obtained was recorded in data collection form and analyzed. The drug –drug interactions were identified in the prescriptions. **RESULTS:** Out of 122 patients, the drug interactions were seen in 99 patients and the percentage is 81% and 23 patients with no drug interaction that is 19% of the total Drug Interaction. The

alternatives were suggested to avoid or overcome the interactions. Several interventions were also made by clinical pharmacists for better therapy outcome. **CONCLUSION:** This highlighted the importance of developing the role of clinical pharmacist in the patients with diabetes and hypertension by minimizing the adverse drug reaction and drug-drug interactions both to improve the quality of life of patients. It also helped in improving patient compliance.

KEYWORDS: Diabetes mellitus, hypertension, comorbidities, hyperglycaemia, drug-drug interactions.

INTRODUCTION

Diabetes mellitus is a chronic progressive metabolic disorder characterized by hyperglycemia due to the deficiency of the hormone insulin. Uncontrolled diabetes mellitus affects virtually any organ in the systems of the human body, mainly heart, kidney, brain, blood vessels and nerves.^[1] Hypertension is a common comorbidity in patients with type 2 diabetes mellitus with a prevalence of up to two thirds of the population and may be present at the time when patients are diagnosed with diabetes mellitus or even before the onset of hyperglycemia. The presence of hypertension increases the risk of cardiovascular diseases in patients with type 2 diabetes mellitus and can put vital organs at risk of developing microvascular complications such as diabetic nephropathy, retinopathy and cerebrovascular diseases such as stroke^[2], etc.

Patients with diabetes mellitus with hypertension often receive multiple medications and this can lead to the appearance of drug-related problems. Problems related to drugs constitute a major public health problem, due to its negative consequences, such as increased morbidity, mortality and health costs.^[3] A problem related to the drug can be defined as any event or circumstance that involves pharmacological treatment, which interferes or potentially interferes with the desired health outcomes.^[4]

High blood pressure is defined as a systolic blood pressure of 140 mmHg or more and / or a diastolic blood pressure of 90 mmHg or more. Systolic blood pressure is the maximum pressure in the arteries when the walls of the heart contracts. Diastolic blood pressure is the minimum pressure in the arteries between contractions of the heart.^{[5],[6]}

Unresolved drug related problems can contribute to recurrent hospital admissions, prolonged hospitalization and increases the healthcare expenditure. The reason could be either improper drug or the dosage, drug- drug interactions or the patient factors such as drug –disease interaction or adherence problems or any other drug related problems.^{[7],[8]}

MATERIALS AND METHODS

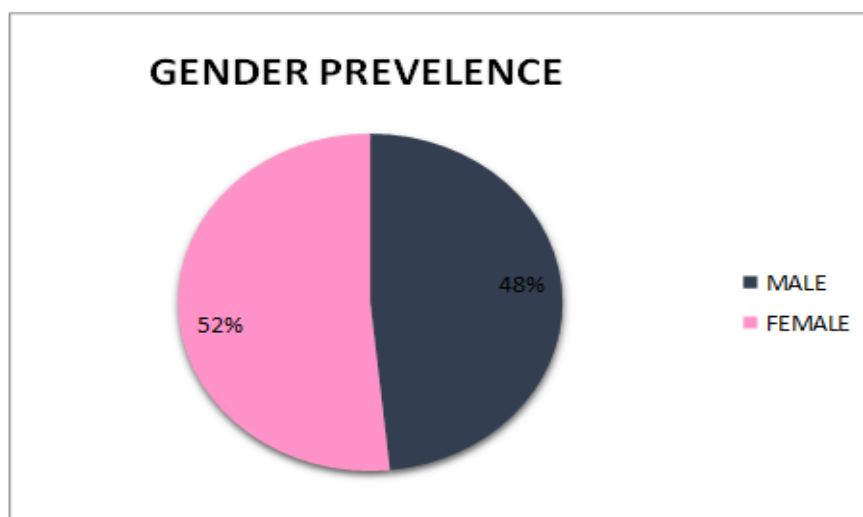
The study was a prospective, interventional study conducted during a period of six months in hospitalized patients with diabetes mellitus and hypertension, with or without comorbidities admitted in the Aster Prime Hospital, Ameerpet, Hyderabad which is a multispeciality

hospital with various departments. The study was approved by the institutional ethics committee. In total, 122 patients participated, which included adult patients with diabetes mellitus and hypertension older than 18 years, prescribed with at least one antidiabetic drug (insulin agents or oral hypoglycaemic agents) and an antihypertensive medication. Patients with diabetes mellitus induced by pregnancy and patients with mental disability were excluded from the study. The pharmacist who intervened was a researcher (clinical pharmacist). All interventions made by the intervening pharmacist were preceded by consultation with the academic pharmacist (guide) and the doctor (co-guide). All hospitalized patients with diabetes mellitus and hypertension were reviewed by the investigator (clinical pharmacist) and those who met the study criteria were included in the study. All necessary data, including patient demographics, past medical history, allergic status, laboratory investigation reports and drug therapy, were collected and documented in the data collection form designed and appropriate to the needs of the patient. study. The researcher actively participated during the rounds of the ward on a daily basis and routinely reviewed all aspects of drug therapy for patients, along with past medical history, laboratory reports and clinical notes from the date of admission to hospital discharge and He interviewed the doctor. as well as patients when necessary. Patient complaints were discussed with respect to drug therapy as part of the disease itself and symptoms attributed to medications reported as drug-related problems. The pharmacological treatment for the patient, including dose, duration and frequency, was reviewed to determine if they were adequate by using references such as the lexi-comps and Micromedex drug information manual for any related problems. with the medicines. The problems related to the identified drug were discussed with the co-guide (doctor) and with the development of the consensus interventions were sent to the respective doctor along with the best possible approach to correct the problems related to the drug during the following daily visits. The problems related to the identified drugs were classified according to the Hepler and Strand Classification and the pharmaceutical interventions were documented by the researcher in the designed documentation form. The level of doctor's acceptance for the particular intervention was also recorded as accepted or not according to the action of the attending physician. Similarly, the researcher also observed the outcome of the intervention and the clinical importance of the problems related to the medications. All the documented data were subsequently evaluated by the team members through the use of descriptive statistics to evaluate the impact of the clinical pharmaceutical intervention in patients with diabetes mellitus and hypertension.

RESULTS**Demographic Data (Gender)****Table 1: Gender Distribution.**

GENDER	NO. OF PATIENTS	PERCENTAGE
MALE	59	48
FEMALE	63	52
TOTAL	122	100

Out of the total 122 patients, 48% (n=59) of patients were male and 52% (n=63) constitutes female patients. So the Female Patients affected were more when compared to Male patients.

**Figure: 1 Gender Prevelence.****AGE****Age Wise Distribution****Table 2: Age Wise Distribution.**

Age Groups	Number of Patients (Male & Female)	Male	Female	Percentage of Males	Percentage of Females	Percentage of Distribution
31-40	2	1	1	0.81	0.81	1.62
41-50	18	11	6	9.01	4.91	13.92
51-60	20	12	9	9.83	7.37	17.2
61-70	50	21	29	17.21	23.77	40.98
71-80	22	11	11	9.01	9.01	18.02
81-100	10	3	7	2.45	5.73	8.18
TOTAL	122	59	63			

The age group distribution in DM II and Hypertension patients were analyzed. The majority of the patients belonged to 61-70 age group categories and next followed by 71-80 age

groups. The average age of the patients getting affected with DM II and Hypertension was found to be 64.3±1.05years.

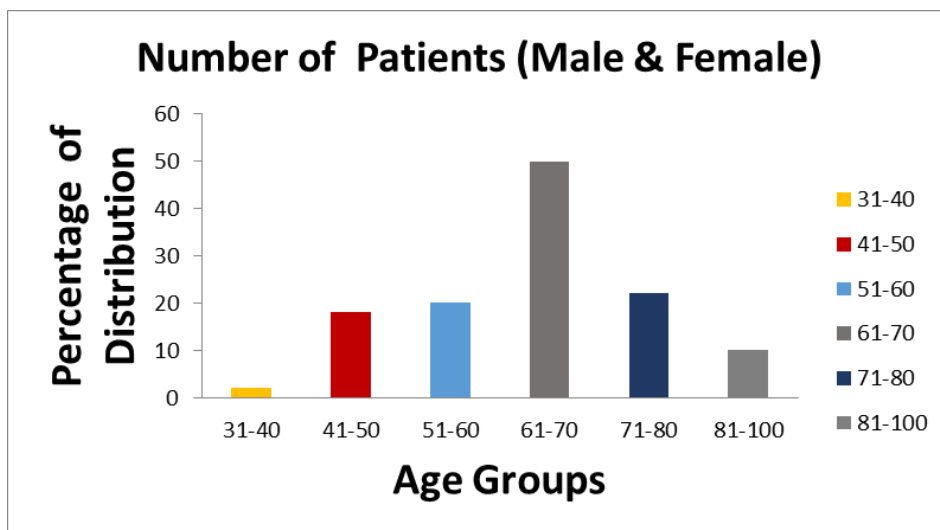


Figure: 2 Age Wise Distribution.

Mean Age

Table 3: Mean Age.

Total Number of Patients	Sum of Total Age's	Mean ± SEM
122	7845	64.3±1.05

The average age of the patients getting affected with DM II and Hypertension was found to be 64.3±1.05years.

Comorbidities

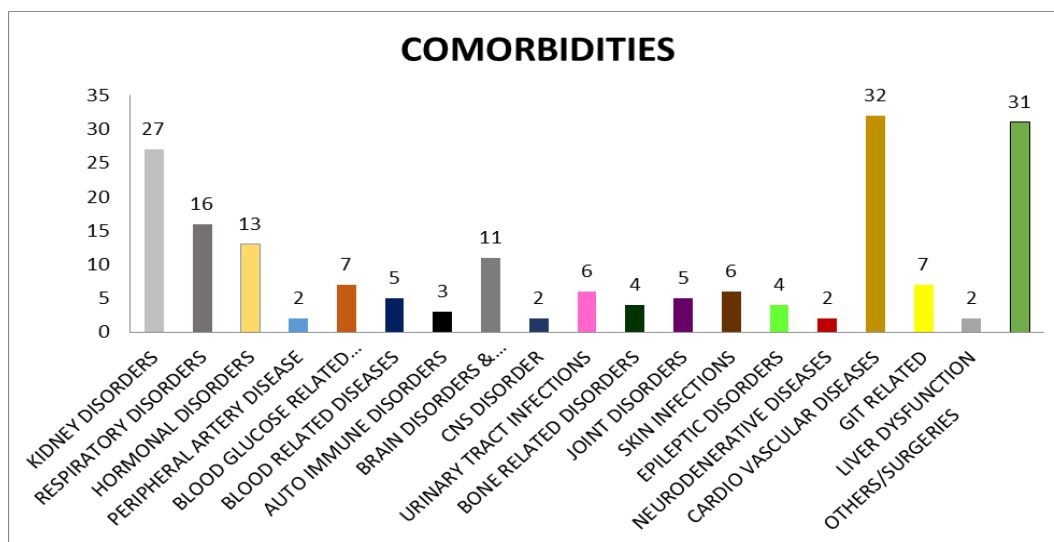


Figure 3: Various Comorbidities In Patients.

The most of the patients were affected with cardiovascular diseases (n=32). The cardiovascular diseases include Hypertension, Angina Pectoris, Myocardial Infarction, Flash Pulmonary Edema, Coronary Artery Diseases, Arterial Fibrillation, Chronic Rheumatic Artery Disease, Cardio renal disease, Ischemic Cardiomyopathy, Ischemic stroke, Brady cardia, P.C.A stroke.

Next followed by Kidney disorders (n=27). The Kidney Disorders include chronic kidney disease, acute kidney injury and acute renal failure-obstructive uropathy.

Next followed by Respiratory Disorders (n=16). The Respiratory Disorders include Bronchial Asthma, Dyselectrolytemia, Allergic Airway disease, Community Acquired Pneumonia, Shortness of Breath, Chronic obstructive pulmonary disorder, Chronic obstructive airway disease, Chronic Bronchorities, Pneumothorax, Upper respiratory tract infection, Lower respiratory tract infection, Respiratory Failure, Bilateral Pneumonities, Pulmonary arterial hypertension.

Next followed by Brain disorders & Neurological disorders (n=11). by Brain disorders & Neurological disorders were found to be Brain stem bleed, Left cerebellar bleed, Cerebro vascular accidents, Post Concessional syndrome, Acute Psychosis, Chronic inflammatory demyelinating polyradiculo neuropathy, Neuroglycopenia, Amnesia.

The rest of the diseases or disorders are mentioned in a tabular column.

Drug Interactions

Table 4: Number And Percentage Of Drug Interactions.

DRUG INTERACTIONS	NO. OF PATIENTS	PERCENTAGE
NO Drug Interactions	23	19
Drug Interactions	99	81
TOTAL	122	100

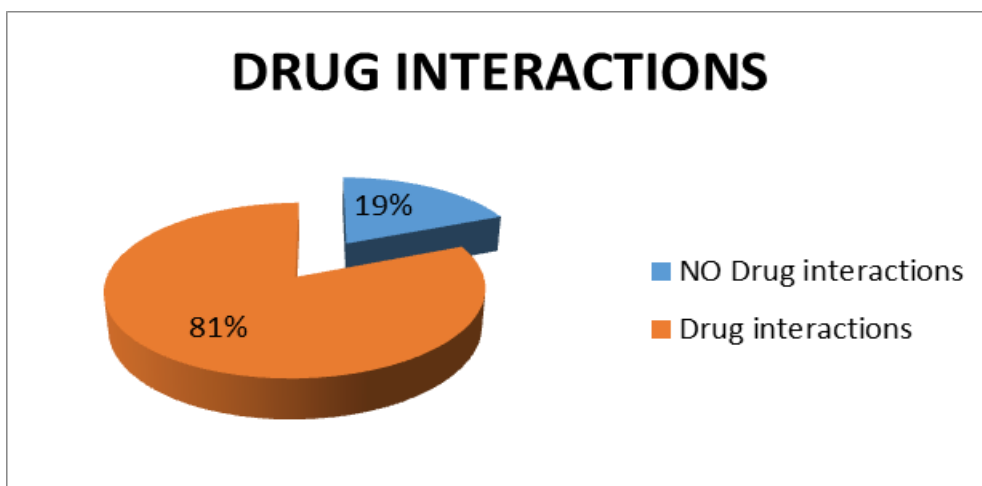


Figure: 4 Drug Interactions.

Drug Interactions

Out of 122 patients, the above graph shows that drug interactions were seen in 99 patients and the percentage is 81% and 23 patients with no drug interaction that is 19% of the total Drug Interaction.

Types of Drug Interactions

Table 5: Level Of Significance Of Drug Interactions.

SNO	Level of significance	Number	Percentage
1	Minor	58	15
2	Moderate	289	76
3	Major	36	9

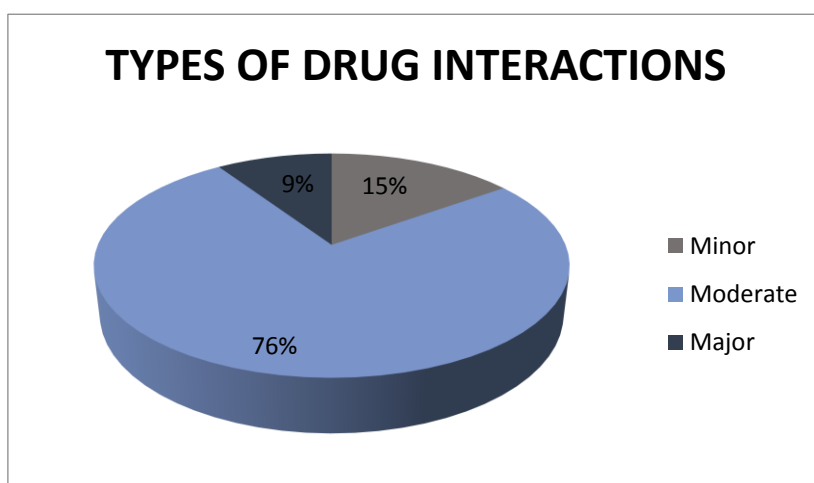


Figure 5: Level Of Significance Of Drug Interactions.

The drug interactions were classified as minor, moderate and major by using Medscape, Clinirex & Drugs.com. Based on the severity of drug interactions the drug is to be monitored. The above chart shows that most of the drug interactions found were moderate that contributes to 76% (n=289) of the patients, so there wasn't any need to change the medication but utmost care has been taken for the patient so that no adverse event or effect occurs. Minor interactions constitutes about 15% (n=58) of the patients and in this type, the interaction is being ignored as these does not cause any alteration in the therapeutic efficacy. Major interactions constitutes about 36% (n=9) where in the drug was eliminated as they may lead to life threatening condition or fatal effect.

Drug Interactions Per Patients

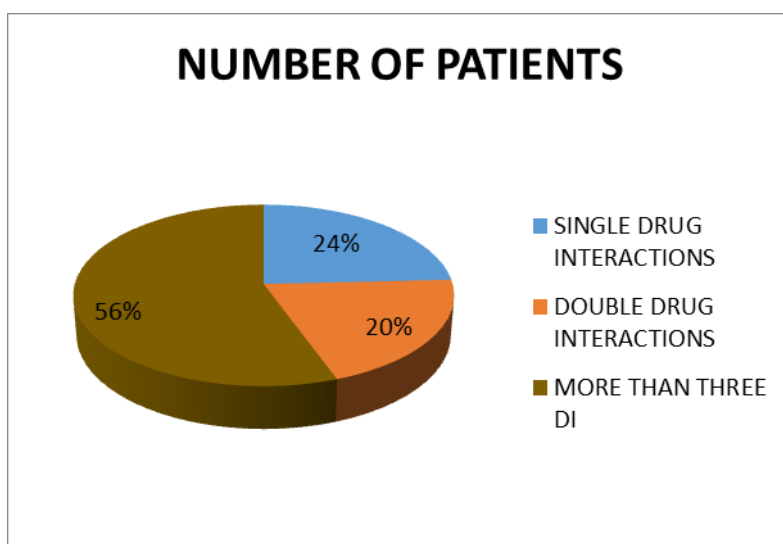


Figure 6: Drug Interactions Per Patients.

The above pie chart was drawn to show that the number of patients with Single, Double and more than three interactions. From the above, one can predict that 24% (n=24) of patients were found with Single Drug Interactions 20% (n=20) of patients with double interactions and 56% (n=55) of patients with more than three drug interactions respectively.

These interactions may lead to adverse events, and dividing them into respective percentages may help to change the medication according to the Risk-Benefit ratio.

The table below shows the drugs which were causing the major category DRUG-DRUG INTERACTIONS. Some of these interactions if not checked or corrected could have been resulted in serious complications.

Table 6: Major Drug-Drug Interactions Found In.

INTERACTING DRUGS	EFFECT DUE TO INTERACTION
LINEZOLID + TRAMADOL	COMBINING THESE MEDICATIONS CAN INCREASE THE RISK OF A RARE BUT SERIOUS CONDITION CALLED THE SEROTONIN SYNDROME, WHICH MAY INCLUDE SYMPTOMS SUCH AS CONFUSION, HALLUCINATION, SEIZURE, EXTREME CHANGES IN BLOOD PRESSURE, INCREASED HEART RATE, FEVER, EXCESSIVE SWEATING, BLURRED VISION, MUSCLE SPASM OR STIFFNESS, TREMOR, STOMACH CRAMP, NAUSEA, VOMITING, AND DIARRHEA. PATIENTS MAY ALSO EXPERIENCE AN INCREASED RISK OF SEIZURES DUE TO LOWERING OF SEIZURE THRESHOLD.
PHENYLEPHRINE+ LINEZOLID	USING PHENYLEPHRINE TOGETHER WITH LINEZOLID CAN INCREASE YOUR BLOOD PRESSURE
CLOPIDOGREL+ ESOMEPRAZOLE	COMBINING THESE MEDICATIONS MAY REDUCE THE EFFECTIVENESS OF CLOPIDOGREL IN PREVENTING HEART ATTACK OR STROKE.
AMIODARONE+ ONDANSETRON	USING AMIODARONE TOGETHER WITH ONDANSETRON CAN INCREASE THE RISK OF AN IRREGULAR HEART RHYTHM THAT MAY BE SERIOUS AND POTENTIALLY LIFE-THREATENING, ALTHOUGH IT IS A RELATIVELY RARE SIDE EFFECT. YOU MAY BE MORE SUSCEPTIBLE IF YOU HAVE A HEART CONDITION CALLED CONGENITAL LONG QT SYNDROME, OTHER CARDIAC DISEASES, CONDUCTION ABNORMALITIES, OR ELECTROLYTE DISTURBANCES (FOR EXAMPLE, MAGNESIUM OR POTASSIUM LOSS DUE TO SEVERE OR PROLONGED DIARRHEA OR VOMITING).
TELMISARTAN+ POTASSIUM CHLORIDE	COMBINING THESE MEDICATIONS MAY SIGNIFICANTLY INCREASE POTASSIUM LEVELS IN THE BLOOD. HIGH LEVELS OF POTASSIUM CAN DEVELOP INTO A CONDITION KNOWN AS HYPERKALEMIA, WHICH IN SEVERE CASES CAN LEAD TO KIDNEY FAILURE, MUSCLE PARALYSIS, IRREGULAR HEART RHYTHM, AND CARDIAC ARREST.
TACROLIMUS+ THIORIDAZINE	THIORIDAZINE CAN CAUSE DOSE-RELATED PROLONGATION OF THE QT INTERVAL. THEORETICALLY, COADMINISTRATION WITH OTHER AGENTS THAT CAN PROLONG THE QT INTERVAL MAY RESULT IN ADDITIVE EFFECTS AND INCREASED RISK OF VENTRICULAR ARRHYTHMIAS INCLUDING TORSADE DE POINTES AND SUDDEN DEATH. IN GENERAL, THE RISK OF AN INDIVIDUAL AGENT OR A COMBINATION OF AGENTS CAUSING VENTRICULAR ARRHYTHMIA IN ASSOCIATION WITH QT

	PROLONGATION IS LARGELY UNPREDICTABLE BUT MAY BE INCREASED BY CERTAIN UNDERLYING RISK FACTORS SUCH AS CONGENITAL LONG QT SYNDROME, CARDIAC DISEASE, AND ELECTROLYTE DISTURBANCES
ONDANSETRON+ THIORIDAZINE	COMBINING THESE MEDICATIONS CAN INCREASE THE RISK OF AN IRREGULAR HEART RHYTHM THAT MAY BE SERIOUS AND POTENTIALLY LIFE-THREATENING, ALTHOUGH IT IS A RELATIVELY RARE SIDE EFFECT. YOU MAY BE MORE SUSCEPTIBLE IF YOU HAVE A HEART CONDITION CALLED CONGENITAL LONG QT SYNDROME, OTHER CARDIAC DISEASES, CONDUCTION ABNORMALITIES, OR ELECTROLYTE DISTURBANCES
CLOPIDOGREL+RABEPRAZOLE	COMBINING THESE MEDICATIONS MAY REDUCE THE EFFECTIVENESS OF CLOPIDOGREL IN PREVENTING HEART ATTACK OR STROKE.
CARBAMAZEPINE+TRAMADOL	CONCOMITANT ADMINISTRATION OF CARBAMAZEPINE INCREASES TRAMADOL METABOLISM, RESULTING IN DECREASED SERUM CONCENTRATIONS AND DECREASED EFFICACY. THE SUGGESTED MECHANISM IS CYP450 METABOLIC INDUCTION BY CARBAMAZEPINE. IN ADDITION, TRAMADOL MAY INCREASE THE RISK OF SEIZURES.
ENOXAPARIN+CLOPIDOGREL	USING ENOXAPARIN TOGETHER WITH CLOPIDOGREL MAY INCREASE THE RISK OF BLEEDING, INCLUDING SEVERE AND SOMETIMES FATAL HEMORRHAGE.
CLARITHROMYCIN+METHYLPREDNISOLONE	CLARITHROMYCIN MAY SIGNIFICANTLY INCREASE THE BLOOD LEVELS OF METHYLPREDNISOLONE. YOU MAY BE MORE LIKELY TO EXPERIENCE SIDE EFFECTS SUCH AS SWELLING, WEIGHT GAIN, HIGH BLOOD PRESSURE, HIGH BLOOD GLUCOSE, MUSCLE WEAKNESS, DEPRESSION, ACNE, THINNING SKIN, STRETCH MARKS, EASY BRUISING, BONE DENSITY LOSS, CATARACTS, MENSTRUAL IRREGULARITIES, EXCESSIVE GROWTH OF FACIAL OR BODY HAIR, AND ABNORMAL DISTRIBUTION OF BODY FAT, ESPECIALLY IN THE FACE, NECK, BACK, AND WAIST.

The Prescriptions.

DISCUSSION

The average age in this study population was higher compared to the average age of other published studies, which could suggest that older hypertensive diabetic patients entered the patient ward than younger patients during the study period. It also confirms that problems related to the drug increase with age and associated comorbidities in elderly patients. In this study, there was an average of 1.3 problems related to medications per patient. To date,

problems related to medications in patients with diabetes mellitus with hypertension are lacking and no comparable study has done so locally and globally. This discrepancy with other studies can be attributed to the differences in the method of study and the context, different classification systems of the problems related to the medications used, and different methods to evaluate problems related to drugs. The high incidence of the problem related to the drug between the 61-80 age range of the study population shows that there was a lack of optimal pharmacological management in clinical practice and a regular review of the use of medications by the patient, especially in these groups of age, can potentially decrease the problem related to the drug.

The study revealed that 71% of the patients had at least one drug related problem which was less than the 90.5% and 80.7% reported by Zaman Huri & Fun wee et al^[9] and Haugbolle & Sorensen^[10] respectively. A study conducted on ambulatory hemodialysis patients showed at least one drug related problem in 97.7% of the total study populations. This variation across the studies may be because of the difference in the study populations and the methodology used. Improper drug selection was the most common drug related problem observed in our study followed by drug use without indication. This study results were consistent with the study carried out by Zaman Huri & Chai Ling^[11] and Ganachari MS et al^[12] where drug choice problem or inappropriate drug selection pattern was the most frequently identified drug related problems. The increased incidence of improper drug selection may be attributed to lack of standard treatment protocol in the hospital or the use of drug which are contraindicated to the patient health condition. For example the use of metformin in diabetes mellitus patient with impaired serum creatinine (serum creatinine 1.8 mg/dl) were the manufacturer recommends you to stop prescribing in such situations. Another incidence of improper drug selection involves the choice of drug in diabetes mellitus patients with hypertension.

The guidelines recommends to use ACE inhibitor or ARB blockers as it offers the advantage of renal protective and proteinuria. Irrespective of the guidelines most of the patients were prescribed with calcium channel blocker amlodipine. Later the intervening pharmacist reviewed the case, proper suggestion was made and the drug therapy changed. There are few cases in which drugs that were categorized as high risk in the modified beers criteria were prescribed to elderly patients with diabetes mellitus and diabetic neuropathy placing them at higher risk of developing drug toxicity. The increased incidence of improper drug selection

highlight the need of a clinical pharmacist in the healthcare team to pay more attention while prescribing these drugs to older hypertensive diabetic patients. Drug use without indication was the second most common drug related problem observed in our study. This study is contrast with the study carried out by Ramesh A et al^[13] found that the second most common drug related problem was drug use without indication. The study conducted by Ramesh M et al^[14] has also shown a high incidence of drug use without indication (18%) as drug related problems. Few instances were drug used without any indication include the use of proton pump inhibitors like pantoprazole, rabeprazole, H2 blockers like ranitidine and anti-infective agents. Although drugs like omeprazole, pantaprazole are used for the prevention of stress induced or drug induce gastritis or ulcer, these agents were prescribed when there was no such indication. In few other cases drugs like paracetamol and anti-emetics like ondansetron were still continued even after fever and vomiting subsided. However, where appropriate pharmacist intervened in such cases and drug was withdrawn from patient therapy. These were assumed when patients' blood pressure, sugar levels or lipid levels were not on target levels despite being on pharmacological treatment when discharged from the hospital. In two cases where the antibiotic dosage were reduced despite a normal border line creatinine (S.Cr: 1.4 mg/dl) suspecting that a dosage adjustment is required. In one another case of dilated cardiomyopathy where carvedilol 3.125mg was prescribed as half the tablet once daily, the dose prescribed was lower than the recommended dose in drug literature.

Antimicrobial agents were the most implicated drug for dosing problems. The percentage of dosing problems reported in our study was found to lesser than that reported by Van Roozendaal and Krass^[15] and this may be due to the lack of assessment of patients hepatic and renal functions in the their study. Caution should be taken in consideration when prescribing drugs in patients with impaired renal function and low glomerular filtration rate as dosage reductions helps to prevent unwanted side effects and decrease unnecessary drug expenditure ad drug toxicity. So the involvement of a clinical pharmacist who is well expertise in drug, dose and its dosing schedule in a healthcare team will helps in deciding the dosing of drugs in special populations. Most of the adverse reactions reported in our study is hypoglycemia in patients receiving insulin's and oral hypoglycemic agents. Antihypertensive agents were also commonly associated with adverse drug reactions. These include hydrochlorthiazide induced hyponatremia, frusemide causing hypokalemia and beta blocker induced giddiness. Also there were cases of antiplatelets aspirin induced gastritis and aminoglycoside drugs like amikacin induced renal failure. In most of the cases the suspected

drug dose was reduced and few cases the identified drug was withdrawn from the treatment chart. Therefore all potential adverse drug reactions should be taken into consideration especially in special populations who might suffer significant deleterious effects. Few untreated indications were identified in the study population during the study period. These includes anemia, dyslipidemia, hyperuricemia and constipation. This has brought to the notice of the concerned physician by the intervening pharmacist and the drug therapy was added. Studies carried out by Ramesh M et al^[14] also identified few incidence of untreated indication as the drug related problems in their study.

Quite few drug interactions were also reported during the study period. In this study, the drugs that were most implicated in drug interactions were aspirin, clopidogrel, warfarin, atorvastatin and some drugs acting on the central nervous system. By contrast, studies carried out by Koh Y et al^[16] also identified drug interactions with most common implicated class of drugs as cardiovascular agents. In clinical practice it is well known that when patient receive poly pharmacy for multiple comorbid condition, there is a chance for occurrence of drug interactions. But still drugs can be used together with close monitoring and in case any toxicity identified then immediate measures should be taken for the corrective actions. The other types of drug related problems includes drug and class duplication were majority due to availability of different formulation with different brand names from different manufacturers leading to error in prescribing. Few cases of transcription error has also been identified in our study. This includes missing out of few drugs from the patient chart when rewriting or transferring the drugs from one to another chart. For example a stroke patient was receiving and antihypertensive drug during their hospital stay, but pharmacist during his routine review of the treatment chart it was found that the antihypertensive has been missed while transcribing the drug to new treatment chart. This incidence has been brought to the notice of the concerned doctor and the remedial action has been taken immediately. This may be because of the increased workload, fatigue and stress on the physician as reported in other studies. So such kind of errors can be minimized by making it mandatory of prescribing generic names and also by reviewing and rechecking of medication order regularly prior to the administration by a clinical pharmacist in a healthcare team.

Cessation of the drug was the most frequently provided by the clinical pharmacist during the study. This includes improper drug selection and drug use without indication. This findings were similar to the study carried out by Ramesh M et al^[14] were cessation of drug was the

most common suggestions provided by the clinical pharmacist but differs from the observation made in another Indian study by Parthasarathi et al^[17] where in change in drug dose was reported as the most frequently provided suggestions by the clinical pharmacist. Improper drug selection includes prescribing a broad spectrum of antibiotics in the treatment of mild urinary tract infections which can be managed by narrow spectrum antibiotic and also prescribing an antibiotic in the treatment of malaria. Examples warranted the cessation of drug includes use of unnecessary vitamin supplements, proton pump inhibitors and antimicrobial agents. Addition of the drug was advised in the case of untreated indications. Substitution of the drug was suggested in ACE inhibitors or ARBs in case of diabetic patients with hypertensive where a channel blocker amlodipine was prescribed. Other suggestions made in our study include change in drug dose, change in duration of therapy, change in frequency of administration, change in route of administration etc. Cardiovascular agents and anti-infective agents were the most common therapeutic class of medications implicated with drug related problems. This result is consistent with the studies carried out by Sathvik et al, Krska J et al, Zaher Al Salmi and Al-hajje et al.^[18, 19, 20, 21] where cardiovascular agents were the highest rate associated with drug related problems but differ from the studies carried out by Struck P et al^[22] in which antibiotics are the most frequently involved in drug related problems. The reason for the difference in the therapeutic classes involved may be because of the differences in the underlying diseases. This findings in our study is not surprising given that patients with diabetes mellitus are usually prone for infection and have cardiovascular comorbidities like hypertension, ischemic heart disease, myocardial infarction etc. This complex medical conditions and use of multiple drug therapy for long term makes this group of patient with diabetes mellitus at high risk of drug related problems.

Considering the clinical level of significance of the total 382 drug interactions identified from 122 patient in our study, 76% were categorized as 'moderate' in grade, followed by 15% as 'minor' and 9% were graded as 'major' level of significance.

The acceptance rate of intervening pharmacist suggestions was found to be but the drug therapy was changed only in some cases. This results is consistent with the other studies carried out in various settings across the world with reported acceptance ranging from 85% to 98%. There were interventions where pharmacist suggestions were accepted, but therapy was not changed. This may be because (a) in few cases where the recommendation if valuable according to the evidence based medicine, was not taken into account because of the already

precarious situation of the patient (patient was very ill, so decided not to change drug therapy because benefits outweighed the possible risk) and (b) the recommendation was not valuable enough according to the treating physician. In the remaining cases, the suggestions were neither accepted nor therapy changed, may be because of the prescribing decisions governed by experience of physicians.

CONCLUSION

It is clearly understood that Diabetes Mellitus & Hypertension is becoming a major drawback in the society. It's causing major panic and also leading to economic losses in the society. To counter act to this situation the health care team i.e. Physicians, Pharmacists, Nurses & other health care professions should work as a team. More effective guidelines to control the disease should be formulated. The awareness programs should be conducted frequently by the government and the non profitable organizations. There is scope for furthermore studies which will help in improving quality of life of the patients.

The urban population was more prone to DM-II & HTN because of behavioral changes like stress, food eating habits (junk foods), environmental changes, sedentary life style etc. The prescriptions have to be evaluated for the drug-drug interactions to avoid fatal circumstances. The quality of life of the patients can be improved by learning about and practicing self care – controlling your weight, diet and exercise, stop smoking, sensible alcohol intake and by taking the prescribed medications on time.

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