ORIGINAL ARTICLE

Drug Utilization Evaluation of Antihypertensive and Antidiabetic Drugs in Geriatric patients in the Dept of Cardiology, Kempegowda Institute of Medical Sciences Hospital & Research Centre Bangalore

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ABSTRACT

Aim: To study the prescribing patterns of antihypertensive and antidiabeticdrugs and identify and reporting of adverse drug reaction (ADRs) and Drug-Drug interaction (DDI) with antihypertensive and antidiabetic drugs in geriatric patients.

Methodology: This study was conducted in the Department of Cardiology, Kempegowda Institute of Medical Science (KIMS) Hospital and Research Centre, Bangalore. for Inclusion criteria, Patients admitted with antihypertensive and antidiabetic drugs to the Department of Cardiology and Patients aged more than 60 years. Data was collected from the case sheet, medication chart of the patients from the day of admission until the patient was discharged from the hospital.

Result: The total number of 100 patients who satisfied the inclusion criteria was included into the study. Among the included patients, 61 (61%) patients were males and 39 (39%) patients were females. Considering the gender with condition distribution of the study population, it was found that five (5%) patients were Type 2 DM, out of which four patients were males and one patient was female. 38(38%) patients with Hypertension, out of which 24 patients were male and 14 patients were female. 57(57%) patients were found to be both Type 2 DM and hypertensive, out of which 33 were male and 24 were female. Considering the age with gender distribution inpatients having both Type 2 DM and hypertension in the study population.

Conclusion: According to the study more males were admitted than females. Hence majority of drug utilization was by males. Hypertension was more prominent in patients than diabetes. ACE inhibitors, Angiotensin receptor blockers, Calcium channel blockers, Diuretics, Beta adrenergic blockers, Alpha adrenergic blockers, Alpha-Beta adrenergic blockers, centrally acting sympatholytic agents, Vasodilators are the most commonly prescribed antihypertensive class of drugs. Sulfonylureas, Biguanide, Alpha glucosidase inhibitors, Dipeptidyl peptidase-4 inhibitors, Insulin are most commonly prescribed antidiabetic class of drugs.

Keywords: Drug Utilization Evaluation, antihypertensive drugs, antidiabetic drugs. drug interaction

INTRODUCTION

Drug utilization research has been defined by the World Health Organization (WHO) in 1977 as, "study of marketing, distribution, prescription and use of drugs in society with special emphasis on the resulting medical socioeconomic consequences". From that point forward various different terms have come into utilization and it is essential to comprehend the interrelationships of the various spaces. Medication use assessment (DUE), some of the time alluded to as medication usage survey (DUR), is an arrangement of nonstop, orderly, criteria-based medicate assessment that guarantees the suitable utilization of medications. It is a technique for acquiring data to recognize issues identified with sedate use and if appropriately created, it likewise gives a method for adjusting the issue and along these lines adds to sane medication treatment. Medication use assessment can survey the genuine procedure of organization or apportioning of a medicine (counting fitting signs, sedate determination, portion, course of organization, term of treatment and medication interactions) and likewise the results of treatment (for example restored infection conditions or diminished degrees of a clinical parameter)[1,7].

Drug Use Evaluation (DUE) aims to understand how and why drugs are used so as to improve appropriate drug use and the health outcome. Drug Utilization Study (DUS) can be planned to dissect the present and the formative patterns of medication use at different levels of the human services framework, regardless of whether national, nearby or institutional. DUS may assess sedate use at a populace level, in light of the statistic subtleties. The goals of medication use assessment include[1,2,3]. The drug specialist and other social insurance professionals have the duty in the simultaneous DUR procedure to evaluate the continuous treatment of the patient and, when vital, mediate to help adjust the patient's treatment plan. When thinking about those patients with different illnesses, caseworkers may turn into effectively associated with the administration of the patient's condition. Through association with the prescriber, a human services specialist inside an oversaw consideration association can better comprehend the consideration plan the prescriber might want to pursue. Through persistent guiding, social insurance specialists can offer training on the best possible utilization of drugs and decide whether there are explicit patient needs[4,9] Due to their skill in sedate treatment the board, social insurance professionals assume a main job in depicting the connection between tranquilize use and patient results utilizing review DUR. While tending to populace based review DUR issues as opposed to person understanding care, the oversaw consideration drug specialist has an essential job in arranging, sorting out furthermore, actualizing DUR exercises. Drug specialists can teach social insurance experts concerning use, take

part in basic leadership inside the setting of the Pharmacy and Therapeutics Committee(PTC), and serve as members of DUR and other committees where input concerning drug use and drug policy development is required[4,8]

Nowadays, medicate usage thinks about (DUS) are utilized as potential apparatus in the assessment of medicinal services frameworks. DUS are incredible exploratory instruments to find out the job of medications in the public eye. They make a sound socio therapeutic and wellbeing financial reason for medicinal services basic leadership. Medication use has gotten fundamental for old consideration, in spite of the fact that, the off base utilization of medications is perhaps the best issue experienced by this populace. The elderly of tense more than one drug, which may lead to drug interactions, adverse effect, concomitant use of other therapies and drug redundancy, and the use of drugs without therapeutic value. These events are, for the most part, related to pharmacodynamics and pharmacokinetic changes that occur at this age. is significant to understand that in proper utilization of medications speak to a potential danger to the patients what's more, superfluous cost. This requires intermittent survey of example of medication use to guarantee safe and compelling treatment.[5,6] The utilization of wrong meds in old people is a significant issue, on account of the expanded defenselessness of this fragment of the populace. Among the old, solution of conceivably unseemly meds (PIMs) has been seen as a typical reason for dismalness and mortality. It was the most significant activating component for the production of criteria for the sheltered utilization of medications among the old, to be specific the Beers criteria, which was at first discharged in 1997 and refreshed in 2002 and 2012.[8]

MATERIALS AND METHODS

This study was conducted in the Department of Cardiology, Kempegowda Institute of Medical Science (KIMS) Hospital and Research Centre, Bangalore. It is a 1200 bedded tertiary care teaching and super specialty hospital, with outpatient and inpatient facility. The hospital provides specialized health care services to all strata of people in and around Bangalore.

It was a prospective, observational study conducted on patients admitted to the Department of Cardiology, KIMS hospital and Research Centre, who are on antihypertensive and antidiabetic drugs. This was an observational study done using a prospective case notes review methodology. The researcher visited the cardiology department of the hospital daily and reviewed the case records of patients aged 60 years and older who had been admitted on that particular day. Data was collected from the case sheet, medication chart of the patients from the day of admission until the patient was discharged from the hospital. Patient details were entered into a specially designed preform:

- Patient details like: Name, Age, Sex
- Details of medications currently prescribed - name of the drug (brand and generic), dose, route of administration, duration of therapy
- Any change in the medication therapy during the hospital stay.

Analysis of The Documented Data:

- The data collected was analyzed.
- Number of drug prescribed to a particular patient during the hospital stay.
- The drugs given was analyzed for prescribing pattern for diagnosis made according to therapeutic classification of the drugs.
- The percentage of drugs prescribed by generic name was calculated.
- The data was evaluated for adverse drug reactions (if any).
- The data was evaluated for any drug-drug interactions (if any).
- The data was analyzed for prescribing pattern of drugs.
- The medication order was assessed for any adverse drug reaction and drug-drug interactions by reference to: Micromedex (drugdex), webmed and standard text books.

RESULT AND DISCUSION

A hospital based prospective study, was conducted to study the utilization pattern of antihypertensive and antidiabetic drugs prescribed to geriatric patients in a cardiology department for a period of six months. The total number of 100 patients who satisfied the inclusion criteria was included into the study. Among the included patients, 61 (61%) patients were males and 39 (39%) patients were females. Considering the gender with condition distribution of the study population, it was found that five (5%) patients were Type 2 DM, out of which four patients were males and one patient was female. 38(38%) patients with Hypertension, out of which 24 patients were male and 14 patients were female. 57(57%) patients were found to be both Type 2 DM and hypertensive, out of which 33 were male and 24 were female. Considering the age with gender distribution inpatients having both Type 2 DM and hypertension in the study population. It was found that 21patients were between the age of 60- 64 years, out of which 12 were males and nine were females. About 21 patients were between the65-69 years, of which 10 were males and 11 were females. seven patients were between 70-74 years, out of which five were males and two were females. five patients were between 75-79 years, of which four were males and one was female. There were about three patients in the age group of 80 years and above, out of which two were males and one was female.

We found the utilization pattern of antidiabetic drugs in 62 patients with Type 2 DM. About 110 prescriptions were prescribed for antidiabetic drugs. Out of which 29 prescriptions were for sulfonylureas of which 28(25.45%) prescriptions were for glimepiride and one (0.90%) prescription for gliclazide, under biguanide 40(36.36%) prescriptions were for metformin. Frequency of Alpha glucosidase inhibitors prescribed was two (1.81%) for voglibose, six prescriptions were for dipeptidyl peptidase -4 of which five (4.54%) prescriptions were for teneligliptin and one (0.90%) prescription for sitagliptin. Frequency of human regular insulin was 33 (30.00%). Table 1.

Table 1: Utilization Pattern of Antidiabetic Drugs in The Study Population with Type 2 DM

Class of ant diabetic drugs	Total number of drugs in each class	Anti Diabetic drugs	Frequency of prescription (n=110)	Prescribing percentage
Biguanide	40	Metformin	40	36.36
Insulin	33	Human Regular Insulin	33	30.00
Sulfonyl ureas	29	Glimepiride	28	25.45
		Gliclazide	01	0.90
Dipeptidyl peptidase-4 inhibitors	06	Teneligliptin	05	4.54
		Sitagliptin	01	0.90
Alpha-glucosidase inhibitors	02	Voglibose	02	1.81
Total	110		110	99.96

Considering the distribution of the antidiabetic drugs prescribed in 62 patients. Out of which, 34 patients received monotherapy and 28 patients received combination therapy. According to prescribing pattern, (28)43.54% of patients were prescribed with monotherapy. (22) 35.48% patients were prescribed with two drug combination, (9)14.51% patients were prescribed with three drug combination and (8)4.83% patients were prescribed with four drug combination.

We identified Metformin and Insulin were the anti-diabetic drugs that were most commonly prescribed in monotherapy. This study reported that frequency of prescription for Metformin was seven and Insulin was 21 as monotherapy treatment for patients with diabetes. The table shows two drug combination therapy included [Glicalzide+ Insulin] (1), [Glimipride+ Metformin] (16), [Insulin+Metformin] (3), [Teneligliptine+ Metformin] (2). Three drug combination therapy included [Glimepride+ Insulin+ Metformin] (7), [Glimipride+ Teneligliptine+ Metformin] (1), [Glimipride+ Voglibose+Metformin](1). Four drug combination included [Glimepride+Insulin+ Metformin+ Teneligliptine] (2), [Glimepride+ Voglibose+ Metformin+Sitagliptin] (1). [Glimepride+ Metformin] combination was commonly used as two drug combination in 16 prescriptions. [Glimepride+ Insulin+ Metformin] combination was commonly used as three combination therapy in seven prescriptions. Monotherapy (28) and two drug combination (22) were used more frequently than three (9) and four (3) combination drug therapy in our study population, which is shown in table (9). This was similar to the study done by Sushrut Varun Satpthy et al., in Sikkim, that has been found the combination antidiabetic drug therapy (65.1%) was used more frequently than monotherapy (34.85%). A combination of two drugs was used in (75.7%) of the patients were as three drug combintions were used in (24.2%) of all the patients receiving combination therapy. The most commonly used two drug combinations were [metformin + glimepiride] (n=74) and [metformin + pioglitazone] (n=47). The three drug combination of [metformin+ voglibose+ sitagliptin] was used in 21 patients, followed by [metformin+ voglibose+ glimepiride], which is used in 30 patients. Table 2

We found the frequency of insulin in combination with oral antidiabetic drugs prescribed in the study population. Here the table shows two drug therapy involved [insulin +metformin] (3) and [insulin+ gliclazide] (1), three drug combination [insulin+ glimepiride+ metformin] (7) and four drug combination included [insulin +glimepiride +metformin+ teneligliptin] (2). The use of insulin in three

drug combination therapy (7) was more when compared to other combination therapies. This shows that insulin was commonly prescribed along with metformin and glimepiride shown in table (10). Table 3

Table 2: Utilization Pattern of Different Antidiabetic Drugs Prescribed in Combination for Patients with Type 2 DM

Antidiabetic drugs	Frequency of prescription	%age
Monotherapy		
Insulin	21	33.87
Metformin	07	11.29
Two drug combination		
Gliclazide+Insulin	01	1.62
Glimepiride+Metformin	16	25.80
Insulin+Metformin	03	4.83
Teneligliptine + Metformin	02	3.22
Three drug combination		
Glimepiride+Insulin +Metformin	07	11.29
Glimepiride+Teneligliptine+ Metformin	01	1.62
Glimepiride+Voglibose +Metformin	01	1.62
Four drug combination		
Glimepiride+Insulin +Metformin +Teneligliptine	02	3.22
Glimepiride+Voglibose+Metformin+Sitagliptin	01	1.62
Total	**62**	**99.99**

Table 3: Utilization Pattern of Insulin Along with Oral Antidiabetic Agents

Drugs	n
Insulin+ Metformin	03
Insulin+ Gliclazide	01
Insulin+ Glimepiride+ Metformin	07
Insulin+ Glimepiride+ Metformin+ Teneligliptin	02
Total	13

We identified ten different class of anti-hypertensive drugs prescribed. Diuretics was the most frequently prescribed class of drugs of which, spironolactone (13.58%) was the most prescribed diuretic followed by furosemide (13.24%) and torsemide (8.68%), chlorthalidone (1.39%), hydrochlorothiazide (1.04%), metolazone (0.34%) and eplerenone (0.34%). Beta adrenergic blocker were the next most prescribed class where metoprolol (21.25%) was the most frequently prescribed followed by atenolol and timolol maleate (0.34%). Angiotensin receptor blocker was the next most prescribed class where telmisartan (14.98%) was the most prescribed drug of this class. Also, in the vasodilator class, nitroglycerin (8.71%) was prescribed

more in this study population continued by isosorbide dinitrate (4.52%), glyceryl trinitrate (2.09%). Calcium channel blocker was next most prescribed class of drug which amlodipine (3.48%). Alpha–beta adrenergic blocker was next which labetolol (1.39%) was a drug prescribed in this class. Alpha adrenergic blocker was next which silodosin and tamsulosin (1.04%), prazosin (0.34%) were prescribed in this class. Drug prescribed from centrally acting sympatholytic agent was clinidipin (1.04%). least prescribed antihypertensive drug was ACE-inhibitor which Ramipril (0.69%).

We identified the utilization pattern of antihypertensive drugs prescribed. Out of 95 patients with hypertension, 24 patients received monotherapy and 71 received combination therapy. In this study, antihypertensive drugs were also prescribed as combination therapy which includes two drug combination 30(31.57%), three drug combination 22(23.15%), four drug combination 12(12.63%), five drug combination 4(4.21%) and six drug combination 3(3.15%). The study showed that two drug therapy (31.57%) was the most frequently prescribed. The next most prescribed was monotherapy (25.26%) followed by three drug combination therapy (23.15%). Considering the utilization pattern of different antihypertensive drugs prescribed as monotherapy for 24 patients with hypertension. Diuretic (16) was the most frequently prescribed followed by beta adrenergic blocker (7) and angiotensin receptor blocker (1). Table 4

Table 4: Drug-Drug Interactions Based on Drug Combination

Type of drug-drug interaction	Number of drug-drug interaction (n=104)	%age
Serious	07	6.73
Monitor closely	79	75.96
Minor	18	17.3
Total	104	99.99

Considering drug-drug interactions between the drugs prescribed to the patients under study (n=100), (6.73%) of which are serious drug-drug interactions, the detail of this category along with their clinical effects have mentioned in Table 15. (75.96%) of drug- drug interactions were found to be monitor closely interactions and minor drug-drug interactions were found to be (17.03%) in our study. Table (14) and figure (11) have been shown the detail related to drug-drug interactions in our study.

CONCLUSION

Due studies, patients will receive medicine appropriate to their clinical needs, in doses to meet their own requirements for their adequate period of time, by this we can avoid irrational use of drugs in elderly patients. The older populace expends a lopsided portion of remedy and drugs as contrasted with more youthful people. These components joined with age related changes in pharmacokinetic and pharmacodynamics parameters that make the older populace increasingly vulnerable to drug collaboration. Accordingly, when the older gets the drug treatment, it must be vital for the well-characterized objectives and given at the most minimal powerful portion to accomplish. Drug-drug interactions might be stayed away from with the stopping of drugs that don't

accomplish the ideal end focuses or that are never again required. According to the study more males were admitted than females. Hence majority of drug utilization was by males. Hypertension was more prominent in patients than diabetes. ACE inhibitors, Angiotensin receptor blockers, Calcium channel blockers, Diuretics, Beta adrenergic blockers, Alpha adrenergic blockers, Alpha-Beta adrenergic blockers, centrally acting sympatholytic agents, Vasodilators are the most commonly prescribed antihypertensive class of drugs. Sulfonylureas, Biguanide, Alpha glucosidase inhibitors, Dipeptidyl peptidase-4 inhibitors, Insulin are most commonly prescribed antidiabetic class of drugs. Polypharmacy have an exceptionally high pervasiveness among hospitalized patients and speaks to an earnest general medical problem that ought to be tended to. In 28 antidiabetics and antihypertensive drugs for our study population,104 drug-drug interaction were found in which monitor closely was the most DDI. Considering the adverse outcomes associated with polypharmacy, including adverse drug events, drug-drug interactions, expanded expense of meds, expanded danger of hospitalization, rebelliousness, and different drug blunders, polypharmacy must be seen genuinely and steps must be taken to decrease it. Medicinal services experts ought to know of the risks and should cut down unnecessary medications to prevent the polypharmacy from occurring.

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