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Original Research Article

Drug utilization pattern among geriatrics according to anatomical therapeutic chemical and defined daily dose classification in a tertiary care hospital

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ABSTRACT

Background: This study was conducted to determine the drug utilization pattern among geriatric inpatients in general medicine department of the hospital.
Methods: An observational, prospective study was conducted for a period of six months (November 2016 to April 2017) among 200 geriatric patients; demographic details, education, occupation, diagnosis and drug details were recorded. The drugs were categorized by anatomical therapeutic classification (ATC) and defined daily dose (DDD) was calculated. The World Health Organization (WHO) prescribing indicators were assessed.
Results: The majority of the patients (59%) were in age group of 60-69 years. Cardiovascular diseases were common among geriatrics. Most commonly prescribed drug was Pantoprazole (81.7%). Drugs were assigned with ATC/DDD codes according to the guidelines of WHO. Drugs prescribed by their generic names were 56.64% and 43% of drugs that were included in the National Essential Medicines List.
Conclusions: Clinical pharmacist have to collaborate and work together with physicians in selecting and adjusting the dose among geriatric population in order to reduce development of potential adverse drug reactions, serious drug related complications and drug interaction.

Keywords: Drug utilization study, Geriatric population, ATC, DDD, Drug use, Essential drug list

INTRODUCTION

Aging is a natural and inevitable phenomenon. Currently the geriatric populace is about 7% of the total population. Drug utilization studies are organized tools to determine the role of drugs in the society. Geriatric medicine is the branch of gerontology which deals with clinical or medical aspects of gerontology. The boundary of old age cannot be specified exactly the same in all the countries, some countries consider an individual of age above 60 as old age or elderly where as some countries take age of above 65 into consideration as old age. However according to "national policy on older persons" in January 1999 this policy defines senior citizen or elderly as a person who is of age 60 years or above.[1] As the age progress there are various physiological changes which affect the pharmacokinetic and dynamics of the drugs.[2] The drugs action is not same as that of in adults so it is necessary to monitor the drug utilization in order to avoid the adverse drug reactions, medication errors and drug-drug interactions.[3]

Presence of comorbidities in elder people require use of multiple medications leading to poly-pharmacy, irrational prescribing, misuse of drugs, increased economic burden, adverse drug reactions and drug interactions.[4] The standard reference for drug utilization is WHO anatomical therapeutic chemical/defined daily dose (ATC/DDD) methodology. For each drug and route of administration, DDD is defined by the WHO collaborating center for drug statistics and methodology as the assumed average maintenance adult dose per day for its main indication. The main objective of this study was to analyze general medication utilization patterns in geriatric patients in a tertiary care hospital.

METHODS

This was a record based observational, prospective study conducted in departments of general medicine in a tertiary care hospital. The study was conducted a period of six months from November 2016 to April 2017. The ethical clearance for the study was obtained from Institutional Ethics Committee of Sri Padmavathi School of Pharmacy. The patients were recruited into the study were given clear explanations about the purpose and nature of the study in a language they could understand. Written informed consent was obtained before inclusion in the study. From the case records of the enrolled patient's demographic details, occupation, diagnosis and drug details were recorded

Inclusion criteria

Patients with age group above 60 years and gender of both sexes were included in the study.

Exclusion criteria

Patients unwilling to participate in the study, patients who are unable to communicate and out patients, ICU patients were excluded from the study.

Sample size

A total of two hundred patients in the geriatric age-group (≥60 years) were included in the study. Drug utilization pattern was evaluated by the proportion of patients receiving particular drugs, its pharmacological groups, WHO core indicators, anatomical therapeutic classification (ATC) code, and DDDs per 100 bed days. Prescription data presented as DDD per 100 bed days may provide a rough estimate of the proportion of the study population that may be treated daily with certain drugs. The collected information was analyzed according to their age, gender and therapeutic category. The prescribed drugs were given with ATC/DDD codes. The socio-demographic data were calculated and expressed as percentages. The summarized results were arranged and put into a table form with the use of Microsoft word 2010.

RESULTS

Demographic data of patients

An observational analytical study was conducted for a period of 6 months from November 2016 to April 2017 in general medicine department at a tertiary care hospital. A total number of 200 cases have been collected.

The demographic data shows that the majority of the patients were in the age group of 60-69 years (59%), followed by age group of 70-79 years (33.5%); the lowest number of patients (5.5%) were in the age-group of >80 (Figure 1).

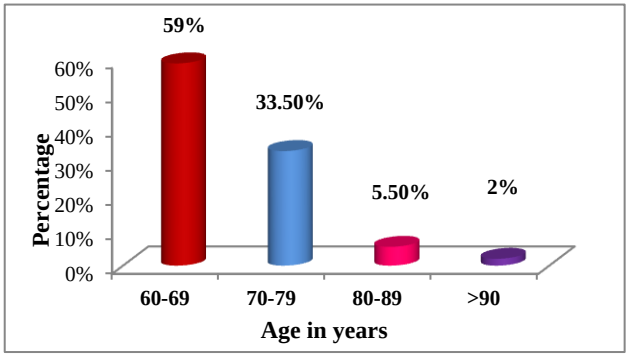

Figure 1: Age distribution of geriatric patients.

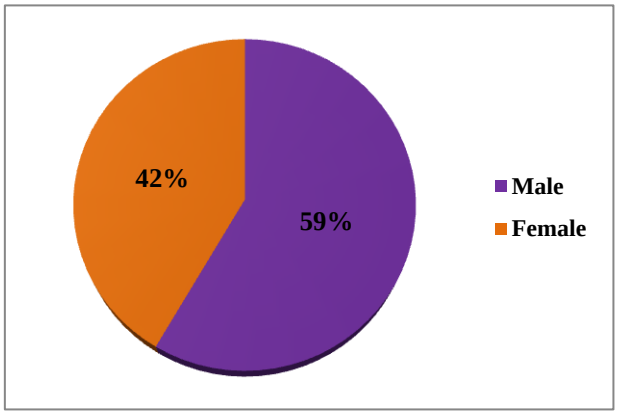

Figure 2: Gender wise distribution of patients.

Table 1: System wise distribution of disorders.

Systems wise disorders	No. of prescriptions	%
Cardiovascular disorders	119	30
CNS disorders	69	17.4
Endocrine disorder	53	13.4
Renal disorders	37	9.3
Respiratory disorders	37	9.3
GI disorders	33	8.3
Hematological disorders	23	5.82
Infectious and other	17	4.3
Musculoskeletal disorders	7	1.7

Out of the total 200 patients, 59% were males and 42% were females (Figure 2).

From the study it was evident that among the sample population of 200 patients suffering from different disorders, cardiovascular disorders was most commonly observed with 119 (30%) followed by CNS disorders 69 (17.4%), endocrine disorders 53 (13.4%), renal and respiratory disorders 37(9.3%), GI disorders 33 (8.3%) and hematological disorders with 5.82% (Table 1).

Upon considering the comorbidities, among the sample size most of patients were presented with common comorbidities like 2 comorbidities (COPD+ Corpulmonale) 28 (21.5%) followed by 3 (T_2DM+HTN+CVA) comorbidities 69 (53%) and 4 (Diabetic foot+T_2DM+Diabetic Nephropathy+DKA) comorbidities 19 (14.4%) and type-2 diabetes mellitus+ischemic cardiac myopathy (T_2DM+ICMP+ Portal HTN+Encephalopathy) (8%) comorbidities (Figure 3).

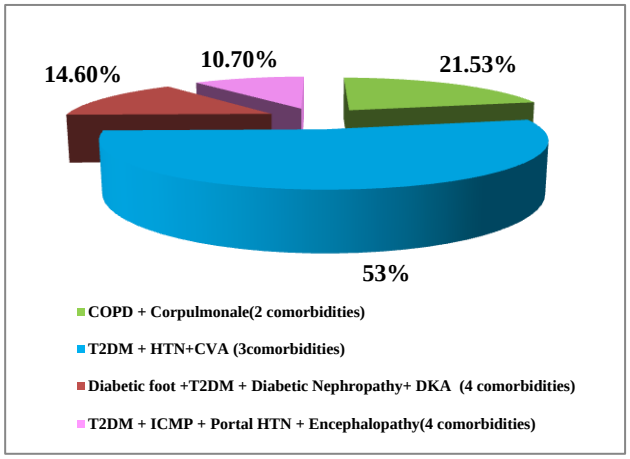

Figure 3: Distribution of comorbidities in the patients.

Table 2: Most commonly prescribed ten drugs.

Name of the drug	No. of prescriptions	%
Pantopprazole	166	35.3
Furosemide (Lasix)	94	20
Aspirin	66	14
Tramadol	30	6.3
Mannitol	27	5.7
Theophylline	27	5.7
Lactulose	17	3.6
Cetrizine	11	2.3
Metformin	11	2.3
Dicyclamine (Cyclopam)	10	2.1

Most of the patients were prescribed with drugs acting on GIT among them Pantoprazole 166 (35.3%) has higher incidence, followed by Furosemide (Lasix) 94 (20%), Aspirin 66 (14%), Tramadol 30 (6.3%), Mannitol and Theophyllin (Derriphyllin) 27 (5.7%), Lactulose 17 (3.6%), Cetrizine and Metformin 11 (2.3) and Dicyclamine (Cyclopam) 10 (2.1) respectively (Table 2).

Table 3: WHO core drug prescribing indicator.

Category	Percentage (%)
Average number of generic drugs per encounter	55.64
Average number of drugs per encounter	3.5
Average number of antibiotics per encounter	12.87
Average number of injections per encounter	42.53
Average number of drugs encounter as per NFI	43

Table 4: Commonly prescribed drugs with their percentages of DDD.

Name of the drug	Dose prescribed	DDD	% OF DDD
Pantoprazole (Pantop)	40 mg	40 mg	2.82
Furosemide (Lasix)	40 mg	40 mg	0.68
Amlodipine	5 mg	5 mg	0.86
Aspirin	75 mg	3 gm	2.8
Clopidogrel	75 mg	75 mg	0.35
Metformin	500 mg	500 mg	1.87
Glimepiride	2 mg	2 mg	0.1361
Ranitidine	150 mg	300 mg	0.08
Tramadol	100 mg	300 mg	0.170
Metoprolol	2.5 mg	2.5 mg	0.013
Propronolol	40 mg	160 mg	0.034
Ondensetron	8 mg	16 mg	0.22
Phenytoin	100 mg	300 mg	0.56
Lactulose	10 mg	6.7 gm	0.43
Lorazepam	2 mg	2.5 mg	0.05
Diazepam	10 mg	10 mg	0.034
Carvedilol	3.12 mg	37.5 mg	0.53
Digoxin	0.25 mg	0.25 mg	0.017
Enalapril	5 mg	10 mg	0.016
Paracetamol	500 mg	3 gm	0.015
Piperacillin+Tazobactum	4.5 gm	14 gm	0.082
Ceftriaxone	1 gm	2 gm	0.056
Atorvastatin	20 mg	20 mg	0.124
Calcium	500 mg	3 gm	0.119
Vitamin-c	500 mg	2 gm	0.068

In this study we have used the W.H.O core drug prescribing indicators among 200 prescriptions as average number of generic drugs per encounter were prescribed in 55.64%, average number of drugs per encounter 3.5% average number of antibiotics per

encounter 12.87%, average number of injections per encounter 42.53% and average number of drugs encounter as per NFI 43% respectively (Table 3).

As Table 4 states the main purpose of ATC/DDD system is to serve as a tool for drug utilization research in order to improve the quality of drug use and its aim of its centre and working group is to maintain stable ATC codes and DDD over the time to allow trends in drug utilization DDD can be defined as the assumed average maintenance dose per day for a drug used for its main indication in adults. DDD will be assigned to those drugs having ATC codes, it is a unit of measurement.

WHO drug prescribing indicators

WHO prescribing indicators were used in our study to assess the drug use pattern in geriatric population as global standards for problem identification.

DISCUSSION

With respect to the study criteria patients of age greater than 60 years have been included. Demographics, history and prescription details were collected by using specially designed proforma.

The study revealed that majority of patient hospitalized were in the range of 60-69 years were 118 (59%) patients followed by 70-79years were 67 (33.5%), 80-89 years were 11 (5%) and age group greater than 90 years were 4 (2%) patients respectively showing that majority of the hospitalized patients fall under the age group range of 60-69 with 118 patients the results were comparable to the findings made by Venkateswaramurthy et al in which majority of elder people were in the age group of less than 74 years.[5]

Among 200 patient's males were 117 (59%) whereas females were 83 (42%) indicating male geriatrics predominance over female which is similar to the study conducted by Abraham et al, where reports of their study reveals that the males are in higher number than females geriatric patients.[6]

The morbidity pattern in our study was commonly found to be cardiovascular disorders among 119 (30%) patients followed by Central nervous system disorders 69 (17.4%), endocrine disorders 53 (13.4%), renal disorders and respiratory disorders 37 (9.3% each), GIT disorders 33 (8.3%), hematological disorders 23 (5.82%), infectious diseases 17 (4.3%) and musculoskeletal disorders 7 (1.7%). Cardiovascular disorders include congestive cardiac failure, Corpulmonale, Ischemic cardiac myopathy from the study we observed that most of the elderly patients have been suffering with cardiovascular disorders. The results were justified with similar geriatric study conducted in India like Kumar et al and Kanagasanthosh et al, reported that the cardiovascular diagnoses were the highest incidence in their study was 28.26% and 29.33% respectively.[7,8] Elder people suffer from two or more comorbidities and the prevalence of common comorbidities like 2 comorbidities (COPD+Corpulmonale) 28 (21.5%) followed by 3 (T2DM+HTN+CVA) comorbidities 69 (53%) and 4 (Diabetic foot+T2DM+Diabetic Nephropathy+DKA) comorbidities 19 (14.4%) and (T2DM+ICMP+Portal HTN+Encephalopathy) (8%) comorbidities. Patients suffering from 3 comorbidities were mostly due to hypertension and diabetes mellitus and these co morbid conditions can increase the risk of developing other complications.

The most frequently prescribed drugs in our study were Pantoprazole 40 mg (35.3%) followed by Lactulose (33.65%). Though cardiovascular disorders were most predominantly found in geriatric patients, Pantoprazole was prescribed in order to avoid Aspirin induced gastric ulcer, as Aspirin was the third most frequently prescribed drug for prophylaxis and maintenance of cardiovascular disorders, which is identical to study conducted by Fadare et al, where aspirin 75 mg is widely used for prevention of cardiovascular complications. Among 200 prescriptions the percentage of drugs prescribed by generic name were about 916 (56.64%), which is less than the standard value of (100%), and brand drugs are 703 (43%) which indicates brand names are widely prescribed by physicians and they are directly influenced by various factors.[8] The percentage of encounter in which an antibiotic was prescribed to be 12.87%, which is acceptable and less than the standard value (20.0%-26.8%).[8] The percentage of encounters in which an injection was prescribed in our study was 42.53%, which is higher than the standard value (13.4%-24.1%) derived to serve as an ideal.[8] The percentage of drugs prescribed according to national formulary of India was 75.57%, which is lower than the standard (100%).[8]

During our study we have separated the 25 most commonly prescribed drugs in the hospital among geriatrics and calculated the DDD/100 bed days as mentioned in Table 4 of results section indicating the consumption of drugs in the hospital for a period of six months with respect to international standards.

CONCLUSION

From this study we conclude that the disease prevalence pattern among geriatric patients was cardiovascular disorders have higher incidence when compared with other morbid conditions however it varies from one area to the other. Prevalence of polypharmacy was high and is usually unavoidable in the elderly people due to existent co morbid conditions among them. As we assigned the ATC/DDD codes which can be used to know the amount of drug utilization in older people. Keeping in the view of the multiple co morbid conditions it is necessary to provide attention while prescribing the drugs among elderly as they are vulnerable to many diseases and drug related problems. The prime duty of clinical pharmacists

is to inspect and evaluate the drug therapy among elderly patients. Clinical pharmacist have to collaborate and work together with physicians in selecting and adjusting the dose among geriatric population in order to reduce development of potential adverse drug reactions, serious drug related complications and drug interactions.

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