

DRUG UTILIZATION STUDY AMONG GERIATRIC PATIENTS IN A TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA

MOHAMMAD ARSHAD, MOHD FAYAZUDDIN*, RAGHUNANDAN MUDIUM, VASANT R CHAVAN

Department of Pharmacology, Raichur Institute of Medical Sciences, Raichur, Karnataka, India. Email: mohdfayazuddin1983@gmail.com

Received: 31 July 2019, Revised and Accepted: 05 September 2019

ABSTRACT

Objectives: The objective of our study is to evaluate the drug utilization pattern among geriatric patients in a tertiary care teaching hospital in South India and analyze the prescription pattern.

Methods: Retrospective medical record analysis was performed for indoor cases of the geriatric patients (aged ≥ 65 years) admitted in medicine wards of Raichur Institute of Medical Sciences teaching hospital, Raichur, from June 2015 to May 2016. They were analyzed for demographics, disease pattern by system involved, disease diagnosed, comorbidity pattern, most commonly prescribed drugs, distribution of drugs according to their therapeutic class, evaluation of polypharmacy, route of administration, fixed-dose combinations, and the World Health Organization core prescribing indicators.

Results: A total of 400 prescriptions of geriatrics patients admitted in inpatient medicine department were randomly selected and all the required data for the study were collected and evaluated. The majority of patients were found to be in the age group of 65–70 years (70.25%). It was noticed that females (51.75%) were more compared to males (48.25%). The drugs prescribed were analyzed. Ranitidine, ceftriaxone, theophylline, and salbutamol were prescribed to majority of the patients in this study group. The average number of drugs per prescription was 7.42; drugs prescribed by generic name were 33.62%. Among the drugs prescribed, 88.69% were from the National List of Essential Medicines. Total encounters having injectable preparations were 100% and total encounters having antibiotic prescribed were 91%. The prevalence of cardiovascular disorders (32.5%) was high followed by respiratory disorders (32.25%).

Conclusion: This study provides insight into the patterns of drug use in our tertiary care hospital on geriatric patients as well as various diseases prevalent among geriatric patients. Widespread polypharmacy, high use of antibiotics and injections, and lack of generic prescribing are some concerns that need to be addressed to promote rational usage of drugs.

Keywords: Geriatrics, Drug utilization, World Health Organization prescribing indicators, Polypharmacy.

© 2019 The Authors. Published by Innovare Academic Sciences Pvt Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>) DOI: <http://dx.doi.org/10.22159/ajpcr.2019.v12i10.35161>

INTRODUCTION

India is aging fast and the geriatric population is currently about 7% of the total population [1] and it is increasing throughout the world with a growth rate of 1.9% which is more than the general population growth rate, i.e., 1.2%. At present, India is the third country after China and the USA with large elderly population in the world [2]. The age of 65 and above is considered as geriatrics, studying on geriatrics is called gerontology [3]. Geriatric medicine is the branch of medicine which deals with clinical and medical aspects of gerontology.

Physiological and pharmacological variations that occur with aging are changes in the gastrointestinal (GI) absorption, reduced absorption from the skin, shrinkage of liver with reduced hepatic blood flow, slower elimination of fat-soluble drugs as the body fat increases in proportion to water and muscle, impaired renal function, reduced glomerular filtration rate, and down or upregulation of various receptors [1]. Such variations affect the usage of drugs in them.

Elderly people of India suffer from both communicable and non-communicable diseases. According to the Government of India statistics, the prevalence of comorbidities is also high among elderly people and these include hypertension (14%), followed by diarrhea (12%), chronic cough (12%), dermatological diseases (12%), illness of heart (9%), diabetes (8.1%), asthma (6%), and urinary problems (5.6%) [4].

Geriatric patients suffer from multiple diseases and hence, need multiple drugs which increase the risk of adverse drug reactions, drug

interactions, irrational prescribing, cost burden, and patient non-compliance. Such problems in their therapy can be solved by regular drug utilization evaluation, by standardizing the prescribing pattern by making prescription guidelines for geriatric patients [2] and by regular prescription checking or else it will cause serious consequences regarding their medications use [3].

Even though geriatric patients consume half of the total drug usage, very few randomized control trials (<5%) have been planned on them, so whatever data available from young subjects are used to formulate prescribing pattern for them [2]. Not much research work is carried out to study the prescribing pattern among the elderly and our study, especially involving geriatric patients, has tried to study their medications use to promote rational usage of drugs among them.

METHODS

Ethical issues

The study was approved by the Institutional Ethical Committee of Raichur Institute of Medical Sciences (RIMS) – Raichur, a tertiary care teaching hospital.

Patient selection criteria

Patients of either sex aged 65 years and above admitted in medicine in ward unit were included in the study. Patients who went away against medical advice, patients on ventilators, or seriously ill patients were excluded from the study.

Study design and area

Our study was a retrospective observational hospital-based drug utilization study on the geriatric patients of the Medicine Department of RIMS tertiary care teaching hospital, Raichur, India.

Study population

The present study was conducted on 400 geriatric patients who were admitted in the male and female medical wards of RIMS tertiary care hospital – Raichur, India.

Study methodology

The study was carried out by regular visits to medical record section of RIMS tertiary care hospital, Raichur, and case sheets of patients of above 65 years of age admitted in medicine ward over a period of 1 year from June 2015 to May 2016 were collected. The relevant data collected from case sheets were properly documented in a separate data collection form. The obtained data were then analyzed for demographic characteristics such as gender distribution, age-wise distribution, reason of admission, number of stay in hospital, distribution of comorbidities, oral and parenteral formulations, category-wise distribution of drugs, and most commonly prescribed drugs.

Drugs prescribed were then analyzed using the World Health Organization (WHO) core prescribing indicators which include mean number of drugs per prescription, use of drugs by generic and brand names, patients prescribed with antibiotics and injections, medications prescribed from the National List of Essential Medicines (NLEM).

Statistical analysis

The statistical analysis was done using the Excel software package. The data were subjected to descriptive analysis using Microsoft Excel. Drugs were verified by NLEMs 2015. Different parameters were given as a percentage and results were expressed as percentage comparison.

RESULTS

In the present study, a total of 400 prescriptions of geriatrics patients admitted in inpatient medicine department were randomly selected and all the required data for the study were collected and evaluated. The enrolled patients were distributed according to gender and age. Among the study population, a total of 2971 formulations were prescribed with an average of 7.42 drugs per prescription. The following parameters were analyzed and evaluated during the study:

- Socio-epidemiological data
 - Gender-wise distribution
 - Age-wise distribution
- Disease or disorder pattern by system involved
- Disease or disorder diagnosed
- Comorbidity pattern
- The WHO core prescribing indicators
- Most commonly prescribed drugs
- Distribution of drugs according to their therapeutic class
- Evaluation of polypharmacy
- Duration of stay
- Route of administration and
- Fixed-dose combinations (FDCs).

Socio-epidemiological data

Among 400 patients, female (51.75%) predominance was observed in comparison of male (48.25%) patients. The majority of patients were in the age group of 65–70 years (70.25%) as depicted in Table 1.

Disease or disorder pattern by system involved

Among the study population, the prevalence of cardiovascular disorders (32.5%) was high, followed by respiratory disorders (32.25%), central nervous system disorders (19%), and GI disorders (10.5%) as depicted in Table 2.

Diseases or disorders diagnosed

Hypertension (15.75%) was the most commonly diagnosed disease in the study population, followed by chronic obstructive pulmonary disorder (15%), ischemic heart disease (10.75%), cerebrovascular accidents (10.25%), tuberculosis (10.25%), and gastroenteritis (9.25%).

Comorbidity pattern

Majority of patients 318 (79.5%) in our study were found suffering with one disease, 72 patients (18%) were found with two diseases, 9 patients (2.25%) were found suffering with three diseases, and only 1 patient (0.25%) was suffering from four diseases.

WHO core prescribing indicators

A total of 2971 drugs were prescribed to the study population with an average of 7.42 drugs per prescription. Only 33.62% of drugs were prescribed by their generic name. The percentage of prescribed drugs from NLEM (2015) was found to be 88.69%. Encounters with antibiotics and injectables were found to be 91% and 100%, respectively (Table 3).

Ten most commonly prescribed drugs

Ranitidine (95.75%) was found to be the most commonly prescribed drug to the study population. Among antibiotics, ceftriaxone (67.5%) was most frequently prescribed drug. Among respiratory drugs to treat asthma and chronic obstructive pulmonary disease (COPD), theophylline (36%) and salbutamol (34.75%) were frequently

Table 1: Demographic characteristics of enrolled patients

Characteristic	Data (%)
Number of patients enrolled in study (n=400)	
Gender	
Male	193 (48.25)
Female	207 (51.75)
Age (in years)	
65–70	281 (70.25)
71–75	55 (13.75)
76–80	39 (9.75)
81–85	13 (3.25)
>85	12 (3)

Table 2: Reason for admission (clinical condition)

Diseases/disorders	n	%
Cardiovascular disorders	130	32.5
Respiratory disorders	129	32.25
Central nervous system disorders	76	19
Gastrointestinal disorders	42	10.5
Blood disorders	26	6.5
Endocrine disorders	25	6.25
Renal disorders	25	6.25
Infectious disorders	20	5
Hepatic disorders	7	1.75
Bone disorders	2	0.5
Miscellaneous disorders	8	2

Table 3: The WHO core prescribing indicators

WHO core indicators	Frequency (%)
Average number of medications per prescription	2971/400=7.42
Total encounters having injectable preparations	400/400=100
Total encounters having antibiotic prescribed	363/400=91
Medications prescribed by generic name	999/2971=33.62
Medications prescribed included in essential drug list	2635/2971=88.69
Drugs prescribed as FDC	254/2971=8.5

WHO: World Health Organization, FDC: Fixed-dose combination

used drugs and among intravenous (IV) fluids, ringer lactate (33%) and normal saline (29.5%) were frequently prescribed and among cardiovascular drugs, aspirin (23.25%) was most commonly used drug (Table 4).

Distribution of drugs according to their therapeutic class

Among 2971 drugs, GI drugs (16.05%) were most frequently prescribed among the study population, followed by cardiovascular drugs (14.23%), IV fluids (13.26%), antibiotics (13.09%), and respiratory drugs (9.5%).

Polypharmacy

A total of 2971 drugs with an average of 7.42 drugs per prescription were prescribed to the study population. 6–10 drugs were prescribed in majority 314 (78.5%) of prescriptions followed by 3–5 drugs were prescribed to 63 prescriptions (15.75%) and >10 drugs were prescribed in 23 (5.75%) prescriptions (Table 5).

Duration of stay

For majority (57.25%) of patients, duration of stay was 0–5 days followed by 6–10 days for 36% of patients (Table 6).

Detail about the number of antibiotics prescribed to the patient, route of administration of drugs and FDCs prescribed are enlisted in Tables 7-9, respectively.

DISCUSSION

Due to aging, elderly people are more vulnerable to various diseases with several comorbidities. To treat the multiple diseases, multidrug therapy is used and this leads to the use of multiple drugs. The chances of drug-drug interaction are high due to multiple drug therapy. It is

estimated that the incidence of polypharmacy is higher among geriatric people as compared to other age group population.

In this study, the numbers of female (51.75%) patients are high as compared to males (48.25%) which is similar to the study done by Nayaka *et al.* [5] which showed female majority, whereas in other studies conducted by Ramanath and Nedumballi [6], Pradhan *et al.* [7], and Singh [4], male patients were high. Maximum patients were in the age group of 65–70 years (70.25%) which is same like studies conducted by Burla [8] and Nayaka *et al.* [5], wherein the maximum patients were in the age group of 60–70 years.

The prevalence of cardiovascular disorder is high in our study (32.5%) followed by respiratory disorders (32.25%) and central nervous system disorders (19%), which is similar to the studies conducted by John and Kumar [9], Jhaveri *et al.* [2], and Singh [4]. Whereas in other studies conducted by Jafrin *et al.* [1] and Goudanavar *et al.* [10], respiratory disorders were more common than cardiovascular disorders. Cardiovascular disorders accounted for more hospitalization in our study, among them, hypertension (15.75%) and ischemic heart disease (10.75%) are most common and in respiratory disorders, the prevalence of COPD (15%) is high.

Majority of patients in our study are suffering from a single disease (79.5%). The presence of comorbidities is very low in our study with one comorbidity found in 18% of patients, followed by two comorbidities in 2.25% and three comorbidities in only 1 patient. The most common comorbidity was hypertension, whereas in a study conducted by Nayaka *et al.* [5], majority 66% had a single comorbid disease.

GI drugs (16.05%) were most frequently prescribed among the study population followed by cardiovascular drugs (14.23%), IV fluids (13.26%), antibiotics (13.09%), and respiratory drugs (9.5%). These are similar to a study conducted by Abraham *et al.* [11],

Table 4: Most frequently prescribed medications

S. No.	Medication name	Number of prescriptions (%)
1.	Ranitidine	383 (95.75)
2.	Ceftriaxone	270 (67.5)
3.	Theophylline	144 (36)
4.	Salbutamol	139 (34.75)
5.	Ringer lactate	132 (33)
6.	Normal saline	118 (29.5)
7.	Paracetamol	113 (28.25)
8.	Dextrose normal saline	104 (26)
9.	Aspirin	93 (23.25)
10.	Ondansetron	91 (22.75)

Table 5: Total number of drugs per encounter

Number of drugs	Number of encounters
3	3
4	14
5	46
6	66
7	89
8	66
9	62
10	31
11	17
12	4
13	2

Table 6: Duration of stay

Duration of stay	Number of encounters (%)
0–5 days	229 (57.25)
6–10 days	144 (36)
11–15 days	15 (3.75)
>15 days	12 (3)

Table 7: Number of antibiotics prescribed in an encounter

Number of antibiotics prescribed	Number of encounters
0	37
1	257
2	83
3	22
4	1

Table 8: Route of administration (n=2971)

S. No.	Route of administration	Number of drugs	Percentage
1.	Parenteral route of administration	1915	64.45
2.	Oral route of administration	915	30.79
3.	Other route of administration	141	4.74

Table 9: FDCs (total-254 prescribed)

Drugs	Number
Theophylline+etophylline	142
Salbutamol+budesonide	62
B complex	22
Oral rehydration solution	21
Antitubercular drugs	19
Iron+folic acid	15
Amoxicillin+clavulanic acid	12
Aspirin+clopidogrel	07
Piracetam+citicoline	05
Furosemide+spironolactone	02

FDC: Fixed-dose combination

wherein GI drugs (17.28%) were frequently used followed by cardiovascular drugs (17.14%).

Prescription by generic name is 33.62% in our study. Other studies conducted by Sharma *et al.* (31.94%) [12], Binod *et al.* (28.92%) [13], and Jafrin *et al.* (26%) [1] have almost same findings. There is a need to encourage the prescribers to prescribe drugs by their generic name, especially in teaching hospitals. Prescription by generic name also reduces the drug cost. The use of brand name also results in the medication errors. The drugs prescribed from NLEM were found to be 88.69% in our study which is very high when compared to other studies such as by Jhaveri *et al.* (48.79%) [2] and Abraham *et al.* (65.15%) [11].

The antibiotics were prescribed to 363 (91%) patients which are greater than studies conducted by Borah *et al.* (61%) [14], Jadhav *et al.* (7.46%) [15], and Datta *et al.* (54%) [16]. Such use of high antibiotics may result in resistance. The percentage of injectable preparations used was 100% which is more than the studies performed by Borah *et al.* (65%) [14] and Sharma *et al.* (14.96%) [12]. The reason for the high use of injections could be that our study was done in a tertiary care hospital where patients with chronic and serious conditions are treated, an injectable form is necessary to produce a faster onset of action. Injections are very expensive compared to other dosage forms and require trained personnel for administration [11].

A total of 2971 drugs were prescribed in all the cases with 64.45% parenteral, 30.79% oral, and 4.74% other formulations. These findings are similar to a study conducted by Balaji *et al.* [17] with 51% parenteral, 35% oral preparation, and 8% other formulations.

Of 2971 drugs prescribed, 254 (8.5%) were FDCs, which is less when compared to other studies such as 25% FDCs in Sharma *et al.* [12] and 17% in Nayaka *et al.* [5]. Most common FDCs prescribed were of theophylline+etophylline and salbutamol + budesonide. However, considering that the number of FDCs in India, which is around 60% of all available formulations, the use of FDCs in our institution is relatively low, reflecting the rational use of medicines [5]. It is also important to note that inappropriate use of drugs represents a potential hazard to the patients and an unnecessary expense [18].

CONCLUSION

This study provides insight into the patterns of drug use in our tertiary care hospital on geriatric patients. The assessment of drugs by the WHO core prescribing indicators will help to improve the prescribing pattern and even to minimize the cost burden of patients. The percentage of medications prescribed from NLEM is very good in our study, but the use of injections and antibiotics was high. The percentage of prescribing by generic name was low, and efforts to encourage prescribing by generic name should be initiated. The average number of drugs per prescription was high, suggesting polypharmacy and inappropriate medication use.

Hence, continuous medical education with a focus on rational drug use and evidence-based medicine should form a part of the program of our hospital. In future, a multidisciplinary approach should be taken involving physicians, nurses, and pharmacists. They have to work as a team for bringing out rational drug use in the geriatric population.

ACKNOWLEDGMENT

The authors are thankful to the director and medical superintendent, RIMS – teaching hospital Raichur, for their unlimited help and support to carry out this work.

AUTHORS' CONTRIBUTIONS

All authors have contributed equally in developing the concept of the study, data collection, data analysis, and drafting the manuscript.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. Jafrin AL, Kumar PV, Udhayalakshmi T, Jayapriya B, Maruti S. Drug utilization patterns of geriatric patients admitted in the medicine department of a tertiary care hospital. *Int J Pharm Life Sci* 2013;4:3087-92.
2. Jhaveri BN, Patel TK, Barvaliya MJ, Tripathi CB. Drug utilization pattern and pharmaco-economic analysis in geriatric medical in-patients of a tertiary care hospital of India. *J Pharmacol Pharmacother* 2014;5:15-20.
3. Battula P, Thandlam MR, Thammisetty DP, Ranganayakulu D. A prospective study on inappropriate drug utilization in geriatric patients at a tertiary care teaching hospital. *Indian J Pharm Pract* 2016;9:178-84.
4. Singh GN. To assess the drug utilization pattern and to analyze pharmaco-economics for geriatrics in-patient in medicine department of tertiary care teaching hospital. *Int J Pharm Pharm Sci* 2017;9:276-82.
5. Nayaka SR, Rajeshwari B, Venkatadri TV. Drug utilization pattern in geriatric inpatients of medicine department in a tertiary care teaching hospital. *Int J Basic Clin Pharmacol* 2015;4:568-73.
6. Ramanath K, Nedumballi S. Assessment of medication-related problems in geriatric patients of a rural tertiary care hospital. *J Young Pharm* 2012;4:273-8.
7. Pradhan S, Panda A, Mohanty M, Behera JP, Ramani YR, Pradhan PK. A study of the prevalence of potentially inappropriate medication in elderly in a tertiary care teaching hospital in the state of Odisha. *Int J Med Public Health* 2015;5:344-8.
8. Burla S. Pattern of medication use among elderly patients attending medicine department in a tertiary care hospital in India. *Asian J Pharm Clin Res* 2016;9:266-9.
9. John NN, Kumar A. A study on polypharmacy in senior Indian population. *Int J Pharm Chem Biol Sci* 2013;3:168-71.
10. Goudanavar P, Keerthi Y, John SE, Jacob J, Krishna MS. A prospective study on medication prescribing pattern for geriatric patients in a tertiary care teaching hospital. *Asian J Biomed Pharm Sci* 2016;6:23-7.
11. Abraham F, Varughese G, Mathew JC, John PM, Sam GK. Drug utilization pattern among geriatric patients in a tertiary care teaching hospital. *Asian J Pharm Clin Res* 2015;8:191-4.
12. Sharma N, Advani U, Kulshreshtha S, Parakh R, Bansal A, Sinha RR. Screening of prescriptions in geriatric population in a tertiary care teaching hospital in North India. *J Phytopharmacol* 2013;2:38-45.
13. Binod R, Sushil K, Kripa T, Kumar KA. Drug utilization pattern in geriatric patients admitted in the medicine department at tertiary care hospital. *Indian J Basic Appl Med Res* 2017;7:36-44.
14. Borah L, Devi D, Debnath PK, Deka D. A study of drug utilization pattern of the geriatric patients in the department of geriatric medicine in a tertiary care hospital in Assam, India. *Asian J Pharm Clin Res* 2017;10:122-6.
15. Jadhav RR, Jadhav AD, Padwal SL, Kale AS, Pise HN. Drug utilization pattern in geriatric out patient in tertiary care hospital. *Int J Basic Clin Pharmacol* 2017;6:2078-81.
16. Datta SK, Paul TR, Monwar M, Khatun A, Islam MR, Ali MA, *et al.* Patterns of prescription and antibiotic use among outpatients in a tertiary care teaching hospital of Bangladesh. *Int J Pharm Pharm Sci* 2016;8:60-3.
17. Balaji V, Aithal S, Geetha S, Swetha ES. Drug utilization pattern among geriatric patients admitted in medical intensive care unit in a tertiary care teaching hospital. *Asian J Pharm Clin Res* 2015;8:281-3.
18. Daniel RT, Sylvia A, Chidambaramathan S, Nirmala P. A prospective study of drug utilization pattern of anti-epileptic drugs and their adverse effects in a tertiary care hospital. *Int J Curr Pharm Res* 2017;9:42-5.