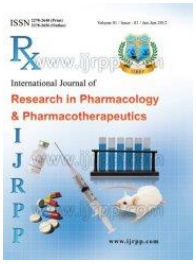
International Journal of Research in Pharmacology & Pharmacotherapeutics



ISSN Print: 2278-2648 ***IJRPP |Vol.7 | Issue 4 | Oct- Dec - 2018***
ISSN Online: 2278-2656 ***Journal Home page: www.ijrpp.com***

Research article ***Open Access***

A study on appropriateness of prescribing pattern in geriatric patients with multiple co-morbid conditions

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ABSTRACT

Geriatrics is the group of people who experience many complex health problems. Poly pharmacy increases the incidence of ADRs, drug interactions, non-compliance which leads to increase in hospital admissions and thus increase health expenditure. Therefore, studies on the assessment of appropriateness of prescribing pattern and drug therapy in elderly particularly in our country are needed to better support decision making process. The study can also give insight into trends in using drugs in elderly and in treating their co-morbid conditions.

The objectives of the study are to analyse the appropriateness of prescribing pattern in geriatric patients with multiple co-morbid conditions in the selected study population as per inclusion criteria. A prospective observational study was conducted. The data was collected during regular ward rounds and was analyzed. The appropriateness of the prescription was analyzed by using the Beers criteria. WHO core prescribing indicators was used to analyze the prescribing pattern.

A total of 120 patients were included in the study. The analysis of appropriateness of prescribing pattern as per Beers Criteria shows that 45 (37.5%) were found to be appropriate and 75 (62.5%) were found to be inappropriate prescriptions. A total number of 153 medications prescribed were found to be potentially inappropriate for geriatric use as per Beers criteria. Analyzing prescriptions as per WHO core prescribing indicators were done, the results reveals that there was an average of 12.92 drugs per prescription, 102 (6.58%) drugs were prescribed by generic name, percentage of encounters with antibiotics was 77.5% and percentage of encounters with injections prescribed were 98.3%. From these results, the prescriptions were found to be irrational according to WHO core prescribing indicators. A key role can be played by the clinical pharmacist to manage drug therapy in collaboration with prescribers for preventing drug related problems resulting from inappropriate medication use in geriatric patients. The study concluded that close monitoring of prescriptions can help to avoid majority of drug related problems and improving the quality of care among the geriatric patients.

Keywords: Geriatrics, Prescribing Pattern, Co-morbid condition, Beers Criteria.

INTRODUCTION

The world's elder population continues to grow at an unprecedented rate. Geriatrics is defined as the branch of medicine that is concerned with the diagnosis, treatment and prevention of disease in older people and the problems specific to aging [1]. Geriatric patients experience many complex health problems. The aged body is different physiologically from the younger adult body, and during old age, the decline of various organ systems becomes manifested [2]. The decrease in physiological reservoir in organs makes the elderly develop certain disease conditions and have more complications, this is due to three main reasons like altered physiology in elders, pharmacokinetic changes and altered pharmacodynamics. The age related issues with prescribing in elderly include co-morbid conditions, cognitive state, nutritional state, living conditions and number of additional drugs prescribed [3].

Major problems associated with geriatric prescribing arises due to poly pharmacy and multiple disease conditions. Poly pharmacy is a common occurrence in elderly patients due to a variety of reasons like increasing number of chronic health conditions, patients being treated by multiple physicians, availability of non-prescription drugs, inadequate patient knowledge about medications and medical conditions and tendency towards self-medication [4]. Multiple medications increase the risks of complications, non-adherence, adverse effects, drug interactions and increased medical cost [5].

Therefore, studies on the prescription pattern of the elderly are needed to support better decision making processes and to prevent drug related problems. Study of prescribing pattern can give insight into appropriateness of drugs and in treating their co-morbid conditions. WHO core prescribing indicators and Beers Criteria are used to analyze the appropriateness of prescribing pattern in geriatrics.

OBJECTIVES

The main objective of our study was to evaluate the appropriateness of the prescribing pattern in geriatric patients with multiple co-morbid conditions.

METHODOLOGY

A prospective –observational study was conducted for duration of 6 months in a 750 bedded multi-specialty hospital located at South India. Regular ward rounds were carried out in the study department and each patient's medication profile was reviewed. A total of 120 patients were included according to inclusion criteria. A patient information form has been prepared, to inform the patient or the caregivers about the purpose and their consent was obtained. The data from medical chart were recorded in customized data entry form. The prescribed drugs were evaluated based on the WHO core prescribing indicators and Beer's criteria and the prescribing pattern was identified and categorized. Other drug related problems such as drug interactions, contraindications and ADR's were monitored and reported. The report on the study results was prepared and the same was submitted to the study department for necessary modification on future therapy for a safe and effective treatment.

RESULTS AND DISCUSSION

A total of 120 patients were included in the study based on the inclusion and exclusion criteria, among them 68 (56.7%) were males and 52 (43.3%) were females. The age categorization was done for both males and females in the study population. In males, it was found that 56 (46.7%) belongs to age group of 65-74 years followed by 12 (10%) in the age group of 75 years and above and in females 39 (32.5%) belongs to the age group of 65-74 years followed by 13 (10.8%) in the age group of 75 years and above. [Table no: 1]

Table No. 1: Age Wise Categorisation of Elderly (N=120)

S.NO	CHRONOLOGICAL CLASSIFICATION	MALE		FEMALE	
		NO. OF PATIENTS	PERCENTAGE (%)	NO. OF PATIENTS	PERCENTAGE (%)
1	EARLY ELDERLY (65-74)	56	46.7	39	32.5
2	LATE ELDERLY (≥75)	12	10	13	10.8

Clinical conditions diagnosed

The incidence of several chronic illnesses in older population is a common occurrence worldwide that leads to poly pharmacy. In the study population 45 (37.5%) patients had two co-morbid clinical conditions and 75 (62.5%) patients had three or more co-morbid conditions. [FIGURE NO. 1]

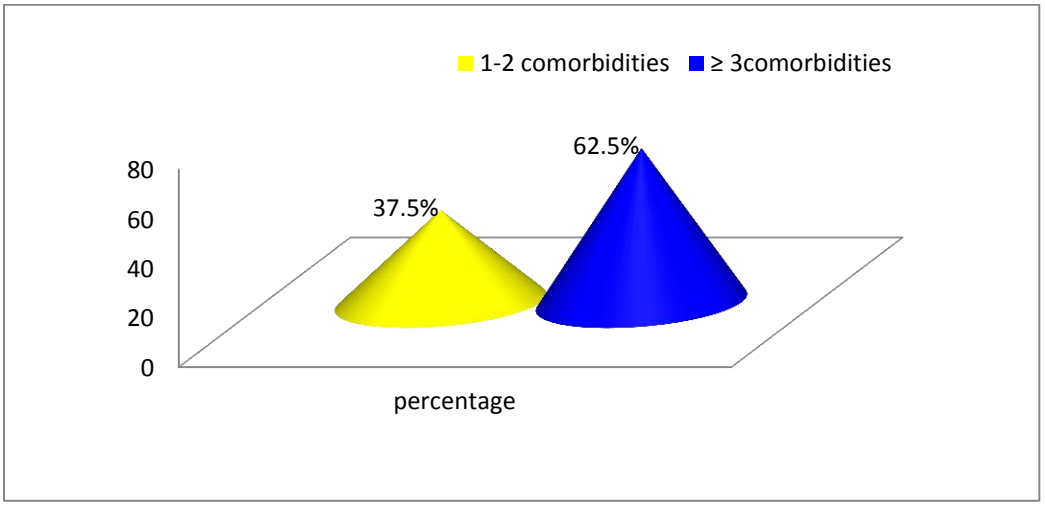

Figure no.1: Distribution of patients according to co-morbid conditions

Our study results reveals majority of the patients were suffering from multiple disease conditions. The results shows that 97 (80.3%) patients were suffering from SHT, 94 (78.33%) patients were suffering from CVD followed by 66 (55%) patients had DM, 42 (35%) patients suffers from LRTI, 34 (28.33%) patients had UTI and other conditions observed are CRF, ARF, asthma, COPD, CVA, liver disease, thyroid disease and anemia. [Table no: 2]

Table no. 2: Clinical conditions diagnosed (n= 120)

S.NO.	CLINICAL CONDITION DIAGNOSED	NO. OF PATIENTS	PERCENTAGE (%)
1.	SHT	97	80.83
2.	CVD	94	78.33
3.	DM	66	55
4.	CHF	43	35.83
5.	LRTI	42	35
6.	CRF/ARF	39	32.5
7.	UTI	34	28.33
8.	ASTHMA/COPD	27	22.5
9.	CVA	19	15.83
10.	LIVER DISEASE	16	13.33
11.	THYROID DISORDERS	12	10
12.	ANAEMIA	12	10
13.	OTHERS	49	40.83

Number of drugs prescribed per patient

The number of drugs prescribed for each patient was calculated. The results revealed that 29 (24.16%) patients have been prescribed with 5-10 drugs, 70 (59.16%) patients were prescribed with 11-15 drugs, 15 (12.48%) patients were prescribed with 16-20 drugs and 5 (4.16%) patients were given more than

20 drugs**.** The above result signifies that all the prescriptions belong to poly pharmacy category. The reason for the poly pharmacy may be the different co-morbid clinical conditions diagnosed in the patients. Studies also reported that the geriatric population is vulnerable to many diseases and prescribed with many drugs leading to poly pharmacy.

Categories of drugs prescribed

The categories of drugs prescribed were analyzed and there were 1551 drugs were prescribed. The average number of drugs prescribed per prescription was 12.92 drugs. The most commonly prescribed drug category is antibiotics accounts for 210 (11.14%) followed by antiulcer drugs 142 (7.53%), antihypertensives 121 (6.42%), antiplatelets and anticoagulants 126 (6.39%), antidiabetic drugs 95 (5.09%) and bronchodilators 96 (5.09%). A study conducted by **Swapna RN et al. (2015)**[6] on drug utilization pattern in geriatric patients reported that antimicrobials and anti-ulcer drugs were commonly prescribed for geriatrics. Our study results correlates with the above study where the antibiotics and antiulcer drugs were commonly prescribed.

Beers criteria analysis

The analysis of appropriateness of prescribing pattern was done as per Beers Criteria. The results shows, 45 (37.5%) prescriptions contain appropriate drugs and 75 (62.5%) prescriptions contain inappropriate drugs for geriatric use. [FIGURE NO. 2]. A study conducted by **Hani AS et al. (2015)**[7] also reports that inappropriate prescriptions were more common in geriatric population.

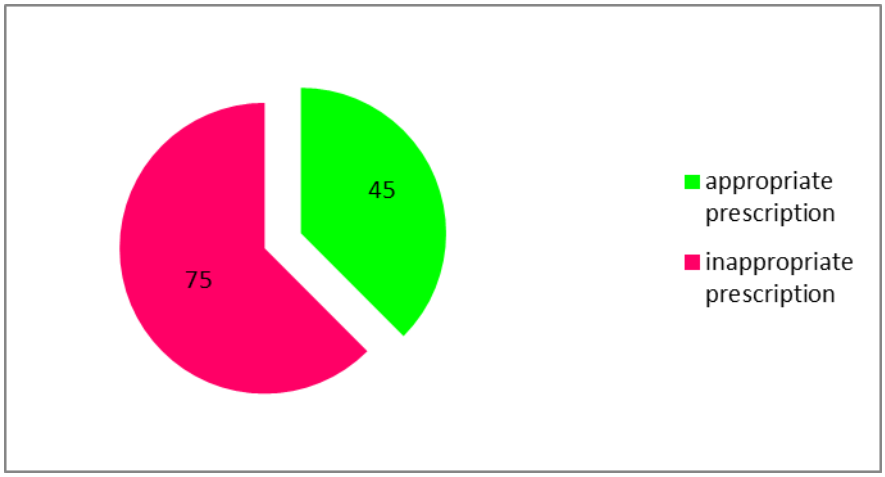

Figure no.2: Beers criteria analysis

A total number of 153 medications used in the study population were found to be inappropriate as per Beers criteria. The results reveals 65 (42.48%) drugs belongs to category 1 that is drugs which are to be avoided in geriatric patients, 6 (3.92%) drugs falls in category 2 those drugs has to be avoided in geriatric patients with certain pathological conditions and 82 (53.59%) of the drugs comes under category 3 which has to be used with caution in geriatrics [Table no: 3]. The results obtained was similar to the study by **Isabella T et al. (2015)**[8] which observed at least one inappropriate medicine in 27.5% prescriptions**.**

Table no. 3: Categories of drugs identified as per beers criteria (n=153)

CATEGORIES	DESCRIPTION	NUMBER OF DRUGS	PERCENTAGE (%)
1	Medications to be avoided in geriatrics	65	42.48
2	Medications to be avoided in geriatrics with certain pathological conditions	6	3.92
3	Medications to be used with caution in geriatrics	82	53.59

The individual drugs under the various categories of Beers criteria were analysed and the results are given in Table no.4. The study revealed that the commonly prescribed drugs in category I were alprazolam 16 (10.45%) and digoxin 14 (9.15%). In category II, prazosin 3 (1.96%) was the most commonly prescribed drug. Torsemide 27 (17.64%) and spironolactone 25 (16.33%) were the most commonly prescribed drugs in category III.

Table no. 4: Inappropriate drugs identified as per beers criteria (n=153)

SL.NO	DRUGS	CATEGORY AS BEER'S CRITERIA	NO; OF PATIENTS	PERCENTAGE (%)
1	Alprazolam	1	16	10.45
2	Digoxin	1	14	9.15
3	Clonazepam	1	9	5.88
4	Amiodarone	1	6	3.92
5	Lorazepam	1	5	3.26
6	Etodolac	1	2	1.30
7	Pheniramine	1	2	1.30
8	Nitrofurantoin	1	2	1.30
9	Hydroxyzine	1	2	1.30
10	Chlorpheniramine	1	2	1.30
11	Amitriptyline	1	1	0.65
12	Clonidine	1	1	0.65
13	Ketorolac	1	1	0.65
14	Naproxen	1	1	0.65
15	Trihexyphenidyl	1	1	0.65
16	Prazosin	2	3	1.96
17	Tramadol	2	1	0.65
18	Verapamil	2	1	0.65
19	Clobazam	2	1	0.65
20	Torsemide	3	27	17.64
21	Spironolactone	3	25	16.33
22	Furosemide	3	21	13.72
23	Hydrochlorthiazide	3	3	1.96
24	Aspirin	3	2	1.30
25	Telmisartan	3	2	1.30
26	Metolazone	3	1	0.65
27	Chlorthiazide	3	1	0.65

WHO core prescribing indicators

The rational and effective use of drugs is analysed using WHO core prescribing indicators. The core prescribing indicators include (1) average number of drugs per encounter; (2) percentage encounter of prescribed injections; (3) percentage encounter of prescribed antibiotics; (4) percentage of drugs prescribed with generic name. The results reveals that there was an average of 12.92 drugs per prescription, 102 (6.58%) drugs were prescribed by Generic name, 93 (77.5%) prescriptions had one or more antibiotics per prescription and a total of 118 (98.3%)prescriptions had at least one injectable [Table no:5]. Based on the analysis of WHO core prescribing indicators, the prescription at the study site were not in accordance with the WHO standard, thus the prescriptions are found to be irrational as per WHO core prescribing indicators. Similar studies conducted on analysing WHO core prescribing indicators also reported that their study prescriptions have not met the WHO standard. [7, 9, 10]

Table no. 5: Analysis of WHO core prescribing indicators

PRESCRIBING INDICATORS ACCESSED	FINDINGS	WHO STANDARD
Average number of drugs per encounter	12.92 (8-22)	1.6-1.8
Percentage of drugs prescribed by generic name (n=1551)	6.58	100%

Percentage of encounters with antibiotics (n=120)	77.5	20-26.8%
Percentage of encounters with injection prescribed (n=120)	98.3	13.4-24.1%

Drug interactions

The prescriptions were analysed for drug-drug interactions. 106 prescriptions had drug-drug interactions and 14 had no interactions. A total of 431 interactions were identified and categorized [FIGURE NO. 3], the results reveals there were 181 major interactions, 222 moderate drug interactions and 28 minor drug interactions. The most commonly found major drug-drug interaction was aspirin and furosemide in 8 (4.41%) patients and aspirin-clopidogrel in 8 (4.41%) patients. Drug-drug interactions can cause serious problems thus there is a need for constant evaluation of these events in order to prevent or manage them with suitable intervention.

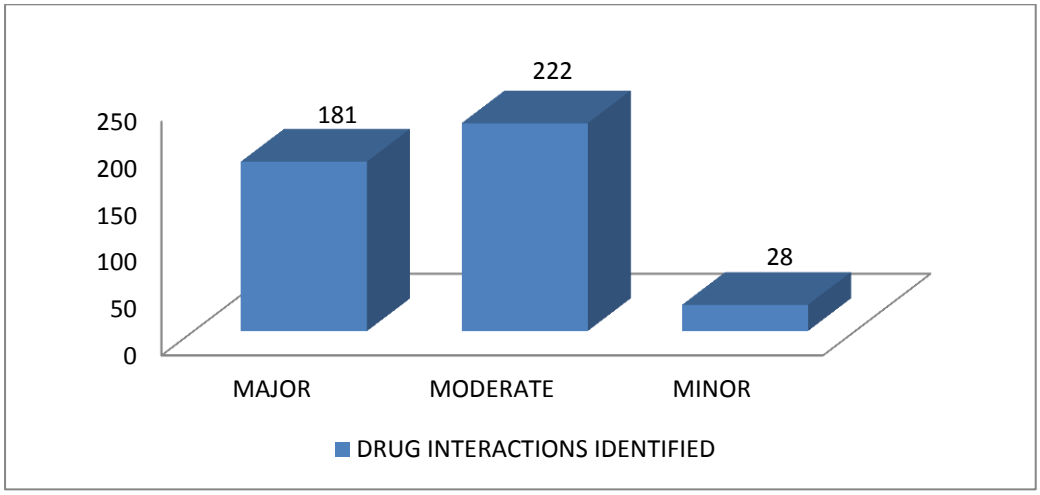

Figure no.3: Drug interactions identified

CONCLUSION

The study has shown that majority of the elderly patients receive more than seven drugs. The drug prescription pattern suggests the need for rational drug therapy. Prevalence of poly pharmacy was high and it is unavoidable due to multiple disease conditions of the patient, thus an intensive monitoring of geriatric prescriptions by clinical pharmacist can avoid drug related problems.

The study stated a convincing evidence for the role of clinical pharmacist in providing pharmaceutical care programme for geriatric patients. In order to have better healthcare outcome in geriatric patients, it is very important for the prescribers to be aware about prescribing guidelines for geriatrics. Implementation of Beers criteria can bring better health care outcomes in elderly. The clinical pharmacist shall function as a part of the health care team to ensure rational use of drugs in elderly which can result in safe and effective medicine use. The study concludes that, close monitoring of prescriptions can help to avoid majority of drug related problems and improve the quality of care given to the geriatric patients.

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