ORIGINAL ARTICLE

Drug Prescribing Pattern in Elderly Patients Admitted in Medicine Department of a Tertiary Care Teaching Hospital in North India-A Prescription Evaluation Study

Rajesh Kumar, Nusrat Kreem Bhat, Dharminder Kumar, Seema Gupta

Abstract

The current study was undertaken to evaluate the drug prescribing pattern and prevalence of potentially inappropriate medications (PIMs) among elderly patients admitted in medicine department of a tertiary care teaching hospital. Observational study was carried out in patients aged 65 years and above for a period of six months. The data was collected from medical record department. Nearly half (50.24%) of the enrolled patients were in the age group of 65-70 years with male preponderance (54.67%). Cardiovascular diseases were the most common cause for hospitalization (57.14%) and the drugs for the treatment of those diseases were the most frequently prescribed drugs (28.64%). Average number of drugs per prescription was observed as 4.79 (range 2 to 12). Use of fixed dose (FDC) combinations (6.87%), and inappropriate prescribing little higher (3.69%). Only 5.03% of drugs were prescribed by generic name and 70.84% of were conformed to essential drug list. Polypharmacy and potentially inappropriate prescribing is substantially high. The current study depicts the need to follow the Beer's criteria strictly in mainstream clinical practice to avoid PMIs in elderly.

Key Words

Beer's criteria, Elderly Patients, Polypharmacy, Potentially Inappropriate Medications

Introduction

Most developed countries have accepted the chronological age of 65 years and above as a definition of elderly as per WHO report (1). Elderly population is also increasing rapidly in India and currently older people account 7.4% of total Indian population which is projected to rise to 12.4% by the year 2026 (2). Generally physiological changes with aging like reduced body water, reduced renal and hepatic functions, reduced blood flow to vital organs and increased body fat alters the pharmacokinetic profile of drugs in elderly (3,4). Prescription of medicines is a fundamental component of health care in all age groups. Prescribing for elderly is always challenging in the context of age-related physiological changes, altered pharmacokinetics and pharmacodynamic effects of many drug. Moreover, the knowledge about the efficacy and safety of many drugs often remain sparse because of exclusion of elderly from clinical trials (5,6,7). Elderly people with multiple co-morbid conditions are often prescribed with several drugs. Polypharmacy has been found to be related to inappropriate prescribing and increase the risk of adverse drug related events and frequent hospitalization. Physicians always face the challenge to use standardized mode for prescribing safely in elderly. Several prescribing indicators and assessment tools have been developed to measure potentially inappropriate medications (PIMs) for elderly. The Beer's criteria is the most frequently used of those explicit methods for determining PIMs (7).

Materials and methods: After obtaining approval of Institutional ethics committee (IEC/2017/436/I,C), a hospital based observational study was carried out in patients of either sex aged 65 years and above, admitted

in general medicine wards of a tertiary care teaching hospital in Jammu, North India for a period of six months. Information extracted from randomly selected 203 medical case sheets included patient's age, sex, registration number, demographic details, disease pattern, co-morbidity, diagnosis, prescribed drugs and their dosages were transferred into a prepared data sheet. The data was analysed for average number of drugs per prescription, percentage of drugs prescribed by generic name, percentage of drugs prescribed from essential drug list, drugs prescribed as fixed dose combinations, using WHO prescribing indicators. American geriatric society updated Beers criteria 2012 was used to assess frequency of potentially inappropriate prescribing in elderly. Beers criteria are comprehensive set of explicit criteria for potentially inappropriate drug use in ambulatory elderly aged 65 years and above (8,9). According to these criteria, drugs which are prescribed inappropriately are classified into one of the following categories: Category A: Drugs that generally should be avoided in older adults. Category B: Drugs that exceed maximum recommended daily dose. Category C: Drugs to be avoided in combination with specific co-morbidity.

Statistical analysis: All data was subjected to descriptive analysis using Microsoft Excel and presenting as proportion and appropriate graphs.

Results

A total of 203 medical case sheets of patients above the age of 65 year were evaluated. Males 111 (54.67%) outnumbered females 92 (45.32%), giving male to female ratio of 1:0.82. Total number of drugs prescribed were 974 with an average of 4.79 drugs (range 2-12) per prescription. More than three quarter (70.84%) drugs were prescribed from essential drugs while only 49 (5.03%) were prescribed with generic name (table 4). As evident from figure-I, nearly half of the sample belongs to 65-70 years of age group. The morbidity profile shows diseases related cardiovascular system were the most common cause for hospitalization (116; 57.14%), followed by respiratory diseases (55; 27.09%), endocrine disorders (53; 26.10%), gastrointestinal diseases (25; 12.31%), diseases of the blood (23; 11.33%) and infectious diseases (21; 10.34%). 34 (16.74%) patients were suffering with miscellaneous disorders like diseases of the musculoskeletal system, skin, renal and gynaecological diseases (*Table 1*).

The class wise distribution of drugs prescribed is shown in table 2. Drugs acting on cardiovascular system were observed to be highly prescribed (279; 28.64%). Among other, drugs for gastrointestinal tract (238; 24.43%), antimicrobials (192; 19.71%), drugs for respiratory system (84; 8.62%), drugs for central nervous system (58; 5.95%), minerals and vitamins (40; 4.1%), analgesics and antiinflammatory drugs (32; 3.28%), drugs for thyroid gland (12; 1.23%) and other conditions like eye, ENT, haemostatic agents & gynaecological disorders (29; 2.97%).

As evident from table 3, 36 (3.69%) drugs were inappropriately prescribed. This forms a major category of inappropriate medications (PMIs) enlisted in Category A of Beer's criteria. The average stay of the patients in the hospital was ten days. Nearly half of patient, 117 (57.63%) were hospitalized for 5 to 10 days where as 13 (6.40%) stayed in the hospital for more than fifteen days (table 5).

Discussion

The present study was aimed to evaluate the drug prescribing pattern in elderly patients. The male preponderance and age related morbidity is in accordance with previous studies conducted in India (10,11,12) but in sharp contradiction to few other studies conducted in India (13,14) and Nigeria (15) where females outnumbered the males. In the present study, cardiovascular diseases were the leading cause (57.14%) for hospitalization in elderly patients followed by respiratory diseases (27.09%). Sharma *et al* (16) has reported the similar results in their study on elderly patients. However, others have reported a different pattern of morbidity with Veena *et al* (17) from Bangalore reported respiratory diseases as the predominant cause for hospital admission. This is not surprising as the geographic pattern is known to vary widely. The difference may purely be due to chance variation as for as selection of medical record is concerned.

Multiple systems were involved in 28 (27.58%) patients and most common co-morbid conditions were hypertension, chronic obstructive pulmonary disease and musculoskeletal disorders. Loss of functional reserve with aging makes geriatric patients vulnerable to development of multiple diseases affecting different body systems. The presence of co-morbidities require multiple and complex drug therapy, which further increase the chances of drug interactions and adverse drug reactions (ADRs).

As for as prescription pattern vis-à-vis class of drug is concerned, there is wide variation reported by authors. Some have reported cardiovascular or bronchodilators or corticosteroids (14) whereas others have predominantly reported antimicrobial or gastroprotective agents (15, 20) while still others have reported CNS and drugs for musculoskeletal disorder (18) as the most commonly prescribed drugs. It is clearly evident that direct comparison is not possible in this situation. The

Table 1. Clinical Condition for Hospitalization

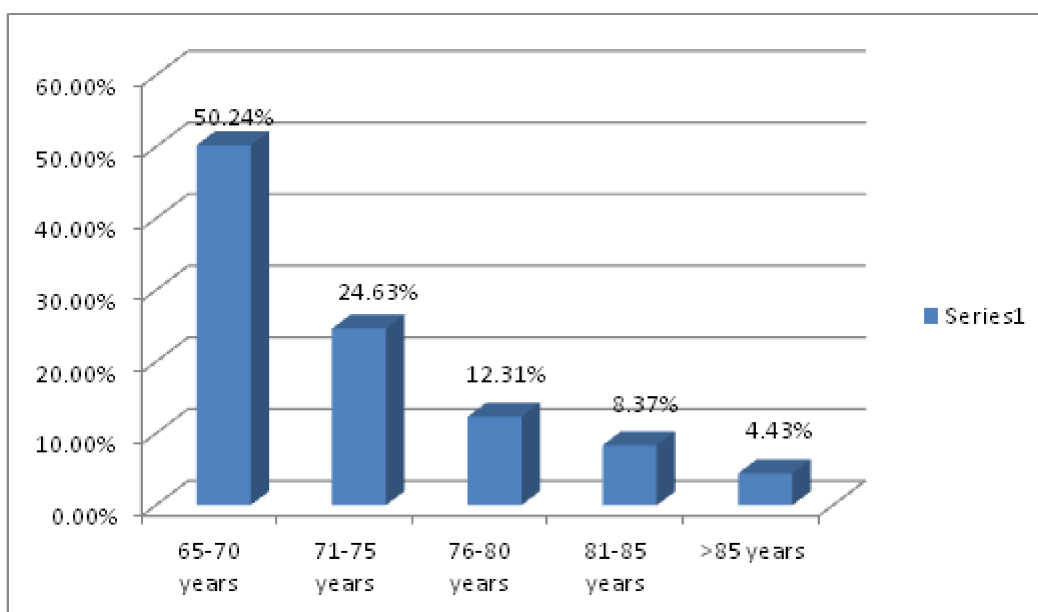| Disease condition	Number of patients (%)
Cardiovascular diseases	116 (57.14)
Respiratory diseases	55 (27.09)
Endocrine disorders	53 (26.10)
Gastrointestinal diseases	25 (12.31)
Diseases of the blood	23 (11.33)
Infectious diseases	21 (10.34)
Miscellaneous disorders	34 (16.74)

Fig-1. Age wise Distribution of Patients

Table 2. Class of Drugs Prescribed

Class of drugs prescribed	Number of drugs (%)
1. Cardiovascular drugs	279 (28.64)
2. Drugs acting on gastrointestinal tract	238 (24.43)
3. Antimicrobials	192 (19.71)
4. Drugs for respiratory system	84 (8.62)
5. Drugs acting on central nervous system	58 (5.95)
6. Minerals and multivitamins	40 (4.1)
7. Analgesics and anti-inflammatory drugs	32 (3.28)
8. Drugs for thyroid gland	12 (1.23)
9. Antidiabetic drugs	10 (1.02)
10. Other drugs	29 (2.97)

discrepancy seem to emerge owing to number of factors such as sociodemographic differences in sample selection (gender; male vs female, age; old vs young, different prevalence pattern of disease; rural vs urban predominance and rich vs poor) (13). Only 6.87% Fixed

dose combinations (FDCs) which is far lower than Nayaka et al (13) and Sharma *et al* (16) who reported 17.19% and 25% FDCs respectively. FDCs increase the risk of drug interactions, ADRs and cause difficulty in titrating dose of an individual ingredient. Though the use of FDCs improve the compliance by decreasing the number of formulations to be consumed, but there benefit/ risk ratio should be ascertained before prescribing.

The number of drugs per prescription is an important index for evaluating medication regimens for rationality or appropriateness in elderly. Average number of drugs prescribed in present study was 4.79 (974/203) which is almost equal (4.53) to the study conducted by Rathnakar *et al* (14). In another Indian study, Sharma *et al* (16) reported 5.51 drugs per prescription. Polypharmacy was also observed in Brazilian and Nigerian studies which have observed 3.8 and 3.9 drugs in each prescription respectively (19,20). However the average number of mediactions prescribed were lower in a prospective study conducted in a secondary care institution in Jammu even though the study focused on common non-communicable diseases (21). The polypharmacy can be explained by the existence of comorbid conditions in elderly patients which can lead to drug-drug interactions and serious adverse drug reactions (14). It is preferable to keep the mean number of drugs per prescription as minimum as possible. This will help to avoid the drug-drug interactions and will decrease the cost of the treatment.

Encouraging prescriptions by generic name is constantly suggested by several national and international organizations to support rational use of drugs. Prescription

Table 3. Prescription of Potentially inappropriate medications

Category	Name of drugs	Total number of drugs (%)
A	Generally to be avoided in elderly	
	Cardiovascular drugs	13 (1.33)
	Antispasmodic (Hyocine)	11 (1.12)
	NSAIDS	07 (0.71)
	Anticholinergic	05 (0.51)
B	Drugs that exceed maximum recommended daily dose	Nil
C	Drugs to be avoided in combination with specific co-morbidity	Nil

Table 4. WHO-CORE prescribing indicators (number of patients = 203).

	Presenting indicator	Frequency (%)
1.	Number of drugs prescribed	974
2.	Average number of drugs per prescription	4.79
3.	Drugs prescribed by generic name	49 (5.03)
4.	Drugs prescribed from essential drugs	690 (70.80)
5.	No. of FDCs prescribed	67 (6.87)
6.	No. of FDCs out of EDL 2017	Nil
7.	No. of banned FDCs prescribed	Nil

Table 5: Duration of stay in the hospital

Duration (in days)	Number of patients (%)
0-5	32 (15.76)
5-10	117 (57.63)
10-15	41 (20.19)
>15	13 (6.40)

by generic name is also known to vary widely across India, with as low as 31.94% (16) and a high of 84.2% (22). The highest reported still falls short of WHO ideal, which is 100%. In current study, only 5.03% drugs were prescribed by generic names which is very less. Prescription under generic name has been shown to improve inventory control, easy purchase of drugs, and reduce the chances of dispensing errors and should be encouraged in current Indian scenario. 690 (70.84%) were prescribed from national list of essential medicines (NLEM). High prevalence of NLEM drugs was also reported by Rathnakar et al 2010 (14) and Sharma et al 2013 (16). In 2010, Eze et al (20) reported 95.4% drugs prescribed Essential medicine list in Nigeria.

Several prescribing indicators and assessment tools are currently available to evaluate medication regimens for rational prescribing or to measure potentially inappropriate medications (PIMs) in elderly. We reviewed the prescribed medications using updated Beer's criteria 2012 by the American Geriatric Society. This is a well established and important tool for assessing appropriateness of prescribing in elderly patients. In current study we observed 36 (3.69%) inappropriately prescribed drugs. This forms a major category of inappropriate medication enlisted in Category A of Beer's criteria which should be avoided in elderly patients. In class wise description, 1.33% cardiovascular drugs (Nifedipine, spironolactone), 1.12% Antispasmodics (Hyocine, Dicyclomine), 0.71% NSAIDs (Diclofenac sodium) and 0.51% Anticholinergic drugs were inappropriately prescribed. The incidence of PIMs prescription in our study is far less as compared to similar previous studies conducted in India. Goudanavar et al (18) reported 8.71% PIMs in 2016. In one of the Indian .... et al (12) observed musculoskeletal disorders as the predominant cause for PIMs. Upper respiratory tract infection was found to be the most common condition for the use of PIMs in elderly by Zaveri et al (10).

Conclusion

As this study was focused on the drug prescribing patterns in elderly, certain points can be highlighted. Polypharmacy is prevalent among elderly. Polypharmacy is unavoidable because of multiple co-morbid conditions, but the multidisciplinary approach is required to avoid potentially inappropriate medications in the elderly. Though there is scarcity of data from different clinical specialities to assess the disease patterns and drug related problems in elderly, but this study has emphasized the need to creat more awareness among clinicians through continuous medical education programmes. The current study depicts the need to follow the Beer's criteria strictly in mainstream clinical practice to avoid PIMs in elderly. The constant efforts of the physicians are needed to improve the generic drug prescription.

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