

Drug Use Patterns among Indian Elderly Outpatients

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Abstract

Objective: Published literature on the characteristics of prescribing medication to the Indian elderly is limited. This study aims to evaluate the prescription pattern among Indian elderly patients using WHO prescribing indicators.

Methods: The prescriptions of 4005 outpatients aged sixty and above were evaluated prospectively using WHO prescribing indicators.

Results: The average age of patients was 68.28±0.11 (±SEM) years. On an average, each patient had 2.01±0.01 diagnoses and was prescribed 6.45±0.04 drugs. The most common disorder which warranted a prescription was “diseases of circulatory system”. The patients were prescribed an average of 6.45±0.04 medications. Over half of the patients (57.9%) received more than five medications concurrently. Only 0.8% of the prescribed drugs had their generic names. Antibiotics were prescribed in 13% of the prescriptions, while 7.3% of patients were prescribed injections. Sixty six percent of the drugs prescribed were from National List of Essential Medicines 2003.

Conclusions: The relatively small amount of prescription of antimicrobials and injections coupled with a higher number of prescriptions from essential drug list is a very positive reflection of rational prescribing among elderly outpatients. However, a high prevalence of polypharmacy, lower number of drugs prescribed by their generic name and from essential drug list indicated that prescribing need requires further refining. This study highlighted the fact that the number of co-morbidities increased with increasing age which resulted in increased number of medications prescribed. This, to the best of our knowledge, is the first set of published results on prescribing in a sample of 4005 Indian outpatients.

Key words: India, elderly, outpatient, ambulatory

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Introduction

India has witnessed a remarkable growth in the life expectancy in the last century. In the early 1930s, the average life expectancy of an Indian

adult was only 32 years. Against a global average life expectancy of 75 years, currently the life expectancy in India is about 67 years. The life expectancy in India is expected to reach 75 years by 2025.¹

Further, the United Nations projections indicate that the Indian elderly population will rise to 21.2% of total by 2055 (from 7.2% estimated in 2005).² This increase in life expectancy may be one of the most significant achievements of Indian healthcare system. At the same time, it also poses a major public health issue.

With the increase in the ageing population, the drug related problems have also increased.³ The healthcare needs of this growing population are based around presence of age related diseases,

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increase in the chances of hospital admissions, longer hospital stays and more extensive drug therapies. In the elderly patients, the multiplicity of disorders requires the use of multiple drugs.⁴ As a result, the risk of adverse drug reactions and drug interactions have increased.³ Preliminary Indian data indicate a very high use of antibiotics, injections and polypharmacy in the elderly inpatients.⁵ Studies on the characterization of prescription pattern among Indian elderly using WHO prescribing indicators are very limited in literature. This study had aimed to evaluate the prescription pattern among Indian elderly outpatients using WHO prescribing indicators.

Methods

A prospective study in the geriatric clinic of public teaching hospital of Chandigarh between July 2009 to February 2011 was conducted. The data on 4115 outpatients was collected. Inclusion criteria included new patients aged 60 years or more attending the geriatric clinic who were prescribed medication(s), and were ready to give written informed consent. The data collection form was completed for all entries for first encounter prescriptions only. Data of 110 outpatients was excluded, as they were incomplete. Patients having hearing problems and those without an attendant were also excluded. Therefore, the results of study are based on a total of 4005 outpatients. The study was approved by Ethics Committee. Each patient was assigned a sequential identification number for study purposes.

The diagnoses of patients were coded using International Classification of Diseases - 10.⁶ The Anatomical Therapeutic Chemical Classification developed by the World Health Organization, was used for coding the drugs.⁷ This approach provides harmonized data that allows comparison with other global studies and also helps to evaluate the effect of interventions aimed at improving prescribing practices and quality of care.

The data obtained was analyzed for WHO recommended prescribing indicators.⁸ The average number of drugs per encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed and percentage of drugs prescribed from National List of Essential Medicines - 2003 (NLEM-2003) were computed.^{9,10} NLEM-2003 was revised in 2011. Therefore, a comparison of the findings using NLEM-2003 and NLEM-2011 was also undertaken.

Statistical analysis

The results are represented as average (\pm SEM) and percentages, as applicable. Statistical analysis was done using SPSS.

Results

A total of 2208 males were included in the study (55%). The average age of patients was 68.28 ± 0.11 years. Out of 4005 patients, 2402 patients belonged to the age group 60-69 years, while 1232 patients belonged to the age group 70-79 years and rest of the patients were over 80 years of age (Table 1).

Table 1: Characteristics of patients (n=4005)

Characteristics	Number (%)
Age in years (Mean \pm SEM)	68.28 \pm 0.11 years
60-69	2402 (60%)
70-79	1232 (30.8%)
80+	371 (9.2%)
Male	2208 (55%)
Female	1797 (45%)
Number of diagnosis (Average \pm SEM)	2.01 \pm 0.01
Single disease	1263 (31.5%)
Two disease	1625 (40.5%)
Triple disease or more	1119 (28%)
Number of Medications (Average \pm SEM)	6.45 \pm 0.04
1-5	1678 (42%)
6-10	1913 (47.8%)
11-15	393 (10%)
More than 15	20 (0.5%)

It was found that 69% of the patients suffered from two or more diseases. On an average, each patient had 2.01 ± 0.01 diagnoses. A fair number [41%] of patients were diagnosed to have two co-morbidities; 21% had three co-morbid conditions and 7.4% had four to six co-morbidities. The most common disease pairs were hypertension-diabetes, coronary artery disease-hypertension/diabetes, hypertension-cerebrovascular disease, diabetes-polyneuropathy and coronary artery disease-digestive disorder.

On performing the system wise analysis of diagnoses, it was found that 97% of the patients

suffered from ‘diseases of circulatory system’ followed by “digestive system disorders” (48%) and ‘endocrine, nutritional, metabolic diseases’, which comprised 44%. Hypertension (64.8%), Diabetes mellitus (36%) and Ischemic Heart Disease (24.7%) were the most frequently reported disorders.

The average number of medications prescribed was 6.45 ± 0.04 . The distribution of medication followed the normal Gaussian distribution. Over half of the patients (57.9%) received more than five medications concurrently.

The analysis of 4005 prescriptions, using WHO recommended prescribing indicators, showed that only 0.8% of drugs were prescribed by their generic name (Table 2). The most common drugs prescribed by their generic name were insulin, calcium and Vitamin B-12 injection. It was found that only 7.3% of patients were prescribed injections mainly - injection Vitamin B12, Insulin, anti-hypertensives, Vecuronium, Dantrolene, Nandrolone, Diclofenac, Erythropoietin and Ofloxacin.

Table 2: Drug use pattern using World Health Organization prescribing indicators

WHO prescribing indicators	Number (%)
Average number of drug	6.45 ± 0.04
Percentage of drug prescribed by generic name	0.8%
Percentage of encounter with an antimicrobials	13%
Percentage of encounter with an injection	7.3%
Percentage of drug prescribed from NLEM-2003	66.3%
<i>Percentage of drug prescribed from NLEM-2011</i>	<i>73%</i>

*The last row has been added to reflect the difference between NLEM 2003 & NLEM 2011

The antimicrobials prescribed to the outpatients comprised 13% of the total drugs prescribed. The three most commonly prescribed classes of antimicrobials were β -lactam antibacterials, macrolides and flouroquinolones. 67% of antimicrobials prescribed belonged to the NLEM-2003. Azithromycin and amoxycillin were the top two antimicrobials prescribed for the treatment of cough. Only sixteen antibiotics were prescribed according to the sensitivity analysis for urinary tract infection. The most common causative microorganisms isolated from culture test of urine were *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus saprophyticus*, *Enterococcus faecalis* and *Proteus mirabilis*. The infections caused by

these microorganisms were treated by nitrofurantoin, linezolid and imipenem.

The percentage of drugs prescribed from NLEM-2003 was 66%. However, this was 73% when the data was analyzed using NLEM-2011.

Discussion

This study provides the first set of results from a large sample of Indian elderly outpatients using WHO prescribing indicators.

The multiplicity of health problems is known to increase with age. This study also indicated that the morbidity increased with increasing age. The number of co-morbidities in patients over 70 years was higher as compared to patients below 70 years ($\chi^2=4.19$ df=1, $p<0.05$). This finding is in concurrence with other results wherein the age above 70 years was significantly associated with higher than average number of co-morbidities.^{11,12} In the present study, 90% of elderly patients presented with chronic disorders. The average number of diagnoses was 2.05 ± 0.01 . This is in agreement with other results.¹³

The evaluation of the morbidity profile among elderly patients and chronic conditions is required for better understanding of the national trends in health of this growing population. “Disease of circulatory system” was found to be most frequently occurring illness, of which hypertension, ischemic heart disease and cerebrovascular disorder were the major contributors. The next most prevalent disorders were diabetes, liver disorders and polyneuropathy.

The average number of drugs prescribed is an important indicator of prescription appraisal. The average number of medications prescribed was 6.5. This was high as compared to WHO recommended average number of drugs per encounter in range of 1.6 to 1.8 as a standard to minimize the risk of further adverse event in patient.¹⁴ It is relevant to mention that antacids, multivitamin and analgesics could have been prescribed, but the primary diagnosis might not have been recorded. It should be borne in mind that many times the patients would demand for medications which increase the pill burden. It is also fair to argue that prescribers should weigh these requests critically before prescribing. In practice, it may not be possible because elderly patients report gastrointestinal disorders and have non-specific weakness and pain. Antacids, multivitamins and analgesics for a short period of time would have been prescribed to tide over these non specific symptoms.

Polypharmacy increases the risk of developing drug related problems. In a study, polypharmacy was associated with an increased potential for adverse drug reactions and drug interactions.¹⁵ It is wise to think before adding another drug to a prescription. A smaller number of drugs per prescription would not only avoid undesirable drug effects but also lead to better drug utilization.

The prescribing of drugs by their generic name is a good practice, and it must be encouraged. A total of 2041 patients from six different cities of Sweden and Iran have reported that almost all drugs (96%) were prescribed by generic names, as compared to this present study (0.8%).¹⁶ The possible reasons for such a sharp difference could be the difference in the healthcare delivery systems across Sweden, Iran and India, differences in prescribing behavior of physicians and availability of drugs in the pharmacy. While prescribing by generic name is to be encouraged, it is also important to respect the confidence the prescribers have in a brand. In developing nations, a reason for unwillingness to substitute the drugs was that cheaper generics may not have the same quality as more expensive products.¹⁷ There is a need to sensitize the doctors to reduce the misconceptions regarding therapeutic value of generic drugs as compared to branded drugs. A systematic review comparing safety and efficacy of branded and generic product has supported that the generic product may be safe and effective as branded product.¹⁸ The use of low priced generic drugs lowers the healthcare costs by reducing the price of prescription drugs as compared to expensive branded drugs. It will also help to avoid misunderstandings regarding multiple names for the same product.

The prescription of injectables in this study is higher than in studies from Nigeria (7.3% vs. 0.8%).¹³ However, injection use in this study was below the WHO standard reference values of 10-17%.¹⁴ The lower use of injections in this study is positive reflection of appropriate prescribing of prescribers. However, the prescribers need to be encouraged to continue the same practice.

Antimicrobials formed 13% of the drugs prescribed in this study. The proportion of patients receiving antibiotics was lower as compared to studies done elsewhere.^{5,13,16} Identified antimicrobials were also studied for their inappropriate use. Antimicrobials prescribed for illnesses for which they are not indicated (e.g. azithromycin, amoxicillin for viral infections) were considered inappropriate.¹⁹ Antibiotics which were not prescribed according to sensitivity data were considered inappropriate, as they may increase

resistance and cost to the patient with ineffective or only marginally effective antimicrobial profiles.¹⁹ In this study, it was found that only 67 (13% of total prescribed Anti Microbial Drugs - AMDs) patients were prescribed AMDs according to the sensitivity patterns and in five cases the prescription was not in accordance with sensitivity testing.

The inappropriate use and increasing resistance to the existing antimicrobials has major public health concern in developing countries because of high prevalence of infections and also, misuse, overuse or abuse of antimicrobial agents.²⁰ WHO has taken initiative and considered antimicrobial resistance as a serious problem that will threaten not only the continued effectiveness of antimicrobials, but also jeopardizes global health security. WHO has introduced a six-point policy package to combat the spread of antimicrobial resistance. The authors are aware that the ministry of health and family welfare is contemplating restriction of availability of certain antimicrobials at the primary level.

WHO also recommended prescribing indicators reflect that essential drugs should offer a cost-effective solution to many health problems and they should be selected with due regard to disease prevalence, be affordable, with assured quality and be available in the appropriate dosage forms.^{21, 22} The prescribing of drugs from NLEM-2003 and NLEM-2011 was 66.3% and 73%, respectively. This difference could be due to the inclusion of most commonly prescribed drugs (like Enoxaparin, Clopidogrel, Atorvastatin and Pantoprazole) in NLEM-2011. The proportion of drugs prescribed from NLEM is a definite positive signal of good prescribing habits. However, compared to Nigerian study, 95% of prescribed drugs were on Nigeria's essential medicines list or formulary.¹³ One possible reason for this discrepancy is lack of the most commonly prescribed drugs for elderly patients in NLEM-2011. Although, NLEM 2003 is revised to NLEM 2011, some of the most commonly prescribed drugs find place (Atorvastatin, Pantoprazole, Clopidogrel, Enoxaparin and Tramadol); there are some important drugs like antihypertensive and antidiabetic agents widely used in current practice are conspicuous by their absence. The drugs not added in NLEM 2011 with better efficacy proven in clinical trials and now in current practice are antihypertensives (Telmisartan, Olmesartan), statins (Rosuvastatin) and ACE inhibitors (Ramipril).

This study provides first largest set of results on prescribing, using WHO prescribing core indicators in Indian elderly outpatients. The lower prescription of antimicrobial, injections and higher

prescriptions from essential drug list is a positive reflection of good prescribing habit among elderly. The higher average number of medications needs to be justified in view of the increased risk of drug interactions, medication errors and non-compliance seen with polypharmacy. This study has also noted that the number of co-morbidities increased with increasing age and results in increased number of prescription of medicines.

These findings will sensitize healthcare system professional on rational use of drug and also help policy makers in formulating and implementing programs aimed at improving prescription practices.

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