Prevalence of polypharmacy and potentially inappropriate medication use among elderly people in the rural field practice area of a medical college in Karnataka

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Abstract

Background: With the rise in proportion of elderly people in India, various problems related to their health are also on the rise. An estimated 50% elderly people in India suffer from at least one chronic disease that requires lifelong medication.

Objective: To assess the prevalence of polypharmacy and potentially inappropriate medication (PIM) use among elderly people in the rural field practice area of a medical college in Karnataka, India.

Materials and Methods: A cross-sectional study was carried out in rural field practice area of a medical college in Karnataka, India. By house-to-house visit, all these individuals were interviewed after obtaining written and informed consent. Information on polypharmacy and PIM use was obtained using the Beers criteria 2012. Data were entered and analyzed using Epi info, version 4.0.

Results: Mean (±SD) number of medication use was 2.57 (±1.47). Prevalence of polypharmacy was 73.93% (minor = 81.15%, major = 18.85%). About 17.5% were taking PIMs according to Beers criteria.

Conclusion: Prevalence of polypharmacy in our study was comparatively less to previous similar hospital-based studies. Minor polypharmacy was more prevalent. A significant number of elderly people were using PIMs according to Beers criteria.

KEY WORDS: Polypharmacy, Beers criteria, elderly people, rural area

Introduction

Both the number and proportion of aged people in India has seen a gradual increase. The proportion of the population aged 60 years and older was about 5% in 1901, which slightly increased to 5.4% in 1951, and by 2011, this proportion was found to have risen to about 8.5%.[1] About 75% of persons aged 60 years and older reside in rural areas in India.[2]

With the rise in proportion of elderly people in India, various problems related to their health are also on the rise. An estimated 50% elderly people in India suffer from at least one chronic disease that requires lifelong medication.[3] Elderly patients show multiple disease state; duplicative prescribing result owing to multiple prescribers; and in patients with intrinsic communication problems, misdiagnosis, unclear drug indications, and use of drugs without indications can occur.[4] Hence, a significant rise in the use of medication among the elderly people has been noted in the last decade.[5] In addition, the practice of using traditional medicines is

more prevalent in Indians, which further increases the risk of drug–drug or drug–disease interactions and resultant adverse drug reactions.[6]

Aging process alters the physiology and body composition in elderly and can influence drug handling, drug response, and sensitivity. This compounded by poor compliance because of cognitive impairment and psychological stress make these patients vulnerable to adverse drug reactions.[7]

Thus, it is prudent to understand the situation of medication use among elderly people in our country. The available literature on drugs used by elderly population in India is scarce, especially in rural areas. Therefore, this study attempts to evaluate the prevalence of drug use by elderly people in a rural field practice area of a medical college in Karnataka, India; to identify problems related to medicine use in the community; and to identify potentially inappropriate medication (PIM) use among elderly population.

Objectives

1. To assess the prevalence of polypharmacy and pattern of use of medications among elderly in the rural field practice area of a medical college in Karnataka, India.
2. To identify PIM use among study population.

Material and Methods

This community-based cross-sectional study was conducted for a period of 2 months between October and November 2014, in the rural field practice area of a medical college in Karnataka, India. All individuals aged 60 years and older, residing in the field practice area, were included as study subjects; those not available even after two visits by the investigator were excluded. A study carried out by Zutshi et al.[8] in Delhi in 2012 has revealed the prevalence of use of more than four medicines as 15%. Assuming the same prevalence, the sample size for this study was estimated with a relative precision of 30% and confidence level of 95%. The required sample size was calculated to be 251.85 (rounded to 260) elderly persons. Each individual was contacted in person by the investigators, and a predesigned, semi-structured questionnaire was administered to obtain information on medication use: both prescribed by a doctor and self-medication from pharmacy. There is no currently accepted international consensus definition of polypharmacy.[9] Subjects were considered to be taking major polypharmacy if they are taking more than or equal to five prescribed medications regularly and minor polypharmacy if two to four prescribed medications regularly.[10] Subjects were considered to take self-medication if taken without prescription by a registered practitioner. Subjects were considered to take potentially inappropriate prescription according to Beers criteria of potentially inappropriate prescribing 2012 criteria.[11]

After data collection, health education was given on the potential implication of multiple drug use and on possible alternative interventions such as physiotherapy for joint pains and so on.

Table 1: Sociodemographic details of study population

Parameter	Frequency	Percentage
Age groups (years)		
60–70	149	53.22
71–80	75	26.78
≥81	56	20.00
Gender		
Men	152	59.28
Women	128	40.72
Socioeconomic status (SES)		
Class 1	15	5.36
Class 2	26	9.29
Class 3	95	33.93
Class 4	89	31.78
Class 5	55	19.64
Total	280	100.00

Table 2: Prevalence of polypharmacy in the study population

Polypharmacy	Frequency	Percentage
Not using medications/no polypharmacy	73	26.07
Polypharmacy	207	73.93
Total	280	100.00

Statistical Analysis

Data were entered in an Excel sheet and analyzed using Epi info, version 4.0. Descriptive statistics such as mean, median, and standard deviation were used to summarize the quantitative data such as age, number of medications used, and so on. Proportions were computed for qualitative parameters such as different classes of medications used by the elderly people. The χ^2 test was used to compare the proportions between polypharmacy and PIM use with self-medication and morbidities. A statistical significance of less than 0.05 was considered.

Results

Total numbers of elderly people identified in the study were 280. The sociodemographic data [Table 1] were as follows: majority of subjects of the study population (53.22%) were in the age group of 60 to 70 years. The mean (±SD) age of the study population was 67.45 (±6.992) years. Gender distribution in the study population was almost equal. Majority of the study population (33.93%) belonged to class 3 according to modified BG Prasad socioeconomic classification.[12]

The prevalence of polypharmacy was 73.93% [Table 2]; among this, minor polypharmacy (2–4 drugs) accounted for 81.15% and major polypharmacy (≥5 drugs) for 18.85% [Table 3]. Mean (±SD) number of medication taken was 2.57 (±1.47).

Table 3: Prevalence of types of polypharmacy in the study population (*n* = 207)

Polypharmacy	Frequency	Percentage
Minor polypharmacy	168	81.15
Major polypharmacy	39	18.85
Total	207	100.00

Table 4: Potentially inappropriate medications use according to 2012 Beers criteria (*n* = 207)

Potentially inappropriate medications (PIM)	Frequency	Percentage
Absent	113	54.59
Present	94	45.41
Total	207	100.00

As shown in Table 4, among those taking any medications (*n* = 207), 45.41% were taking PIMs according to Beers criteria 2012.[11] The most commonly used PIM were analgesics and antidepressants, followed by vasodilators.

Table 5 shows association of morbidities per subject and polypharmacy. An increase in both major and minor polypharmacies was noted with increase in number of morbidities, and it was found to be statistically significant (*P* < 0.05).

About one-third of the study population (30%) was self-medicating. As shown in Table 6, the PIM use was found to be 65.75% among those taking self-medication and 23.23% among those not taking self-medication. This difference in PIM use among those taking self-medication was found to be statistically significant (*P* < 0.05).

Discussion

Drug treatment planning in old age is made more complex because comorbid diseases may affect the absorption, volume of distribution, protein binding, and, especially, elimination of many drugs, leading to fluctuation in therapeutic levels and increased risk of under- or overdosing. Drug excretion is affected by renal and liver changes with aging that may not be detectable with usual clinical tests. Formulas for estimating glomerular filtration rate in older patients are available, whereas estimating changes in hepatic excretion is still a challenge. Patients with many diseases are usually prescribed multiple

Table 6: Association of self-medication with potentially inappropriate medication use (*n* = 207)

Self-medication	Potentially inappropriate medications (PIM)		Total, *N* (%)
	Absent, *N* (%)	Present, *N* (%)	
No	76 (76.77)	23 (23.23)	99 (100.00)
Yes	37 (34.25)	71 (65.75)	108 (100.00)
Total	113 (54.59)	94 (45.41)	207 (100.00)

$\chi^2 = 35.96$, *df* = 1, *P* < 0.001.

drugs, especially when they are cared for by multiple specialists who do not communicate. The risk of adverse drug reactions, drug–drug interactions, and poor compliance increases geometrically with the number of drugs prescribed and with the severity of frailty.[13]

Polypharmacy

The prevalence of polypharmacy was high in the study population (73.93%) and the mean (±SD) medication use was 2.57 (±1.47). Similar results have been noted in the previous studies conducted in India and other countries. In India, the prevalence of polypharmacy ranged from 45% to 89.13%,[14–17] and the mean (SD) use medication was found to be 8.42 (±2.4).[18]

Minor polypharmacy (2–4 drugs) accounted for 81.15% and major polypharmacy (≥5 drugs) for 18.85% in our study. Similar result has been noted in the previous study conducted by Srikanth and Sireesha.[15]

Even in other countries, systematic reviews[19] and multicenteric studies[20–22] have reported a high prevalence of polypharmacy. In the study conducted by Rahman et al.[23] in Bangladesh, the average number of drugs and antibiotics prescribed per prescriptions was 3.8 and 1.3, respectively.

Self-Medication

About one-third of the study population (30%) was self-medicating, which was less compared with a study conducted by Blenkiron,[24] where it was present in almost half of the study population. The most commonly abused medications were analgesics and sedatives.

Potentially Inappropriate Medications

According to Beers criteria 2012, around 45.41% were taking PIMs, and the most commonly used PIM were diclofenac

Table 5: Association of morbidities with polypharmacy (*n* = 207)

No. of morbidities per subject	Polypharmacy		Total, *N* (%)
	Minor polypharmacy, *N* (%)	Major polypharmacy, *N* (%)	
1	15 (60.00)	10 (40.00)	25 (100.00)
2	68 (83.95)	13 (16.05)	81 (100.00)
3	85 (85.14)	16 (14.86)	101 (100.00)
Total	168 (81.15)	39 (18.85)	207 (100.00)

$\chi^2 = 8.33$, *df* = 4, *P* = 0.01.

and amitriptyline, followed by vasodilators. In the previous studies conducted in India, PIM use was found to range from 40% to 57.4%[25,26] and the most commonly used medication were analgesics/antipyretics and antacids/antiulcer drugs.[27] Studies conducted in other countries using the Beers 2012 criteria have reported a similar prevalence of PIM use.[28,29] The most often used medications were metoclopramide, ketoprofen, and aspirin.[30]

Limitations of the Study

The study was based on using questionnaire to collect information on polypharmacy and PIM use. Investigations to substantiate the information collected on medication use can give better picture about the influence of polypharmacy and PIM use in elderly people.

Recommendations

The use of medication to a disease condition is necessary, but unnecessary load of patient with more medications will increase the safety problem. The medication regimen can be simplified by eliminating pharmacological duplication, decreasing dose frequency, and regular review of drug regimen. The goal should be to prescribe the least complex drug regimen for the patient as possible, while considering the medication problem and symptoms and, of course, the cost of therapy. Rational prescription will eliminate use of PIMs. Self-medication should be condemned, in turn, which avoids PIMs.

Conclusion

Prevalence of polypharmacy in our study was comparatively less with previous similar hospital-based studies. Polypharmacy is a significant issue, and little research has been conducted, information on which is required for primary care providers. In absence of acute conditions, minor polypharmacy is more prevalent. This poses an eminent threat of shifting to major polypharmacy, especially in elderly age group. A significant number of elderly people were using PIMs according to Beers criteria.

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