



Case Report Article

Prevalence of polypharmacy and unnecessary drug therapy on geriatric hospitalized patient in a tertiary care hospital

Mufeed A, Venkateswaramurthy N\*, Sambathkumar R

J.K.K.Natraja College of Pharmacy, Kumarapalayam, Tamilnadu, Pin- 638183, India.

ABSTRACT

**Background & Objectives:** Polypharmacy is defined as the administration of many drugs at the same time or the administration of an excessive number of drugs. The demographic transition in the elderly population constitutes a significant challenge for health authorities worldwide and as a result, elderly people tend to take multiple medications in a day that can be referred to as polypharmacy. The burden of taking multiple medications has been associated with greater health care costs and an increased risk of adverse drug events (ADEs), drug-interactions, medication non-adherence, reduced functional capacity and multiple geriatric syndromes. Pharmaceutical care plays an important role in the reduction of polypharmacy in the elderly. The aims and objectives of the proposed study was to determine the incidence rate, various risk factors influencing the increased rates of polypharmacy and contributing factors and incidence rate of unnecessary drug therapy in our geriatric population.

**Methods:** This was a prospective observational study conducted in a tertiary care hospital at Erode for 6 months to determine the incidence rate, various risk factors influencing the increased rates of polypharmacy and contributing factors and incidence rate of unnecessary drug therapy in our geriatric population. We conducted this study in both male and female patients aged above 65 years who were taking more than 5 medications daily with complete medical and medication history who were admitted in different medical or surgical ward. During the study, purpose of the study was explained to the subjects verbally. The details of geriatrics were collected in data entry forms.

**Results and discussion:** A total of 300 hospitalized geriatric patients were monitored out of which females were predominantly high (54%). Out of 300 patients, most of the patients were in the age group of 61-65 years (35.5%) followed by 66- 70 years (25%) and cardiovascular disorders were the most common cause of admission during the study period (46%), followed by endocrine diseases like diabetes (20%). All 300 admitted patients have one or more comorbidities and hypertension and diabetes are the major ones. Out of 300 geriatric patients 50% were in hospital for 3- 6 days. Out of 300 patients, most of the patients 285 were prescribed with antiulcer drugs, ranitidine. In the study site most of the prescribers were include ranitidine in their prescriptions, which make the reason for these results. Out of 300 participants, 237 were taking 5 or more than 5 drugs. That means 79% of total study population experiencing polypharmacy. Geriatric population therefore is prescribed and uses more drugs than younger populations. In addition, multiple complaints, atypical disease presentation and physician prescribing habits and practices have resulted in the use of multiple drugs in this population

**Conclusion:** Our study concluded that most of our geriatric population experiences polypharmacy, at least once in their life due to multiple comorbidities. Prevention of polypharmacy and unnecessary drug therapy in geriatric population can be achieved through elimination of all medications without therapeutic benefit, goal or indication. Elimination of unnecessary drug therapy will also contribute in cost saving among elderly patients.

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\*Corresponding author details:

**Dr. N. Venkateswaramurthy**  
Professor (M. Pharm., Ph.D.)  
J.K.K.Natraja College of Pharmacy,  
Kumarapalayam, Tamilnadu, India.

Tel: +91 9842724689

E-mail address:  
[venkateswaramurthy.n@jkkn.org](mailto:venkateswaramurthy.n@jkkn.org)

1. Introduction

1.1. Polypharmacy

Polypharmacy is defined by the World Health Organization as "the administration of many drugs at the same time or the administration of an excessive number of drugs" (Fulton and Allen, 2005). The term of "polypharmacy" originated from the

Greek word "poly" which means "more than one" generally (Bushardt et al., 2008; Maher et al., 2014). Multiple drug use can be named as polypharmacy, but there are many different definitions for this term in the literature. Some of these defin-

-itions are (a) medication did not match diagnosis; (b) the use of several drugs concurrently for the treatment of one or more coexisting diseases; (c) Concurrent use of 5–9 drugs; (d) The use of potentially inappropriate medications, which can increase the risk for adverse drug events (Bushardt et al., 2008; Medeiros-Souza et al., 2007; Jerson et al., 2012; Lees et al., 2011; Takane et al., 2013; Finkers et al., 2007; Onder et al., 2012; Maggiore et al., 2010; Viktil et al., 2007).

Besides, according to some definitions topical and herbal drugs, vitamin and minerals are not included to the polypharmacy. On the other hand, the duration of therapy is important on polypharmacy for some definitions (Medeiros-Souza et al., 2007)

In this context, one of the most common definitions of polypharmacy is the concurrent use of six or more medications by a patient. The number of medications varies from 4 to 10 in different studies (Finkers et al., 2007; Onder et al., 2012; Haider et al., 2009; Keshishian et al., 2008). In some researches, 0–4 drug use is named as non-polypharmacy, concurrent use of 5–9 drugs defined as polypharmacy, on the other hand 10 and more drugs as excessive polypharmacy (Onder et al., 2012).

The study was aims to determine the incidence rate, various risk factors influencing the increased rates of polypharmacy and contributing factors and incidence rate of unnecessary drug therapy in our geriatric population. The objective of the present investigation was to (a) to determine the incidence rate of polypharmacy (b) to determine the contributing factors for polypharmacy; (c) To determine the most frequently prescribed drug in geriatric population; (d) To determine the incidence rate of unnecessary drug therapy; and (e) To determine the contributing factors for unnecessary drug therapy.

## 1.2. Epidemiology of polypharmacy in geriatrics

World Health Organization has evaluated that in every nine people there is one elderly people, i.e. of age 60 years or older. This value is to be expected to increase to one in five people by 2050 accounting for about half of the total growth of the world population. The demographic transition in the elderly population constitutes a significant challenge for health authorities worldwide as with advancing age multiple chronic diseases such as hypertension, diabetes mellitus, arthritis, chronic heart disease, renal diseases, etc. are associated. As a result of which elderly people tend to take multiple medications in a day that can be referred to as polypharmacy (Hajjar et al., 2007). Various studies globally have shown that on an average 2-9 medications per day are taken by the elderly people (Fulton and Allen, 2005). The prevalence of inappropriate medication used by the elderly people was found to be from 11.5-62.5% (Kwan and Farrell, 2014).

## 2. Methodology

This was a prospective observational study conducted in a tertiary care hospital at Erode for 6 months to determine the incidence rate, various risk factors influencing the increased rates of polypharmacy and contributing factors and incidence rate of unnecessary drug therapy in our geriatric population. During the study, purpose of the study was explained to the

subjects verbally. The details of geriatrics were collected in data entry forms.

### 2.1. Inclusion criteria

- Patients above 65 years of age
- Patients takes more than five medications daily
- Both male and female patients can participate
- Patients admitted in different medical/surgical ward
- Patients with complete medical and medication history
- Patients who are willing to participate

### 2.2. Exclusion criteria

- Patients below 65 years of age
- Patients visited in outpatient department
- Patients with incomplete/improper medical records

## 3. Results and discussion

The current prospective study was intended to evaluate the prevalence of polypharmacy and unnecessary drug therapy in hospitalized geriatric population and was carried out in a tertiary care hospital at Erode, Tamil nadu for a period of 6 month in the year, 2017. A total of 300 hospitalized geriatric patients were monitored (Table 1). Out of 300 geriatric patients admitted in different departments in hospital, predominantly were females (54%). According to Ministry of Statistics and Programme Implementation, Government of India, population census 2011 there are nearly 104 million elderly persons in India; 53 million females and 51 million males (Census report of India, 2011).

Out of 300 geriatric patients admitted in hospital, most of the patients (35.5%) were in the age group of 61-65 years followed by 66- 70 years (25%) [Table 2]. This can be explained with the help of population study in India. According to a study based on population census 2011, conducted by Institute of Social and Economic Change, Bangalore, people with age of 60-64 years is more when compared to other geriatric population (Shraddha and Bani., 2013). The increased prevalence in this age group can be collated to the demographic transition in India with a sharp decline in the death rate as well as the birth rate. The life expectancy of an average Indian male is 67.3 years and that of females is 69.6 years (Jackson and Wenger, 2011).

Cardiovascular disorders were the most common cause of admission during the study period (46%), followed by endocrine diseases like diabetes (20%) [Table 3]. According to Jackson and Wenger (2011), coronary heart diseases is the leading cause of death of elderly men and women; 81% of adults who die of CHD in the elderly are aged 65 or elder (Amna et al., 2016). In a similar study, conducted by Amna andco-workers, also concluded the same results (Patterson et al., 2012).

All 300 admitted patients have one or more comorbidities and hypertension and diabetes are the major ones (Table 4). Most of the patients were admitted with cardiovascular or related diseases, so comorbidities were common. Out of 300

geriatric patients 50% were in hospital for 3- 6 days (Table 5). Most of the admitted patients were heart patients and respiratory patients. Out of 300 patients, most of the patients 285 were prescribed with antiulcer drug (ranitidine HCl). In the study site most of the prescribers were include ranitidine in their prescribers, which make the reason for these results. Prevalence of hypertension in Indian population makes antihypertensive a major prescribed group (Table 6). Out of 300 participants, 237 were taking 5 or more than 5 drugs. That means 79% of total study population experiencing polypharmacy (Figure 2). This result can be explained like this: With increasing age comes an increasing vulnerability to develop diseases and, in the elderly, the tendency to acquire multiple and chronic diseases. This population therefore is prescribed and uses more drugs than younger populations. In addition, multiple complaints, atypical disease presentation and physician prescribing habits and practices have resulted in the use of multiple drugs in this population (Bushardt et al., 2008).

Out of 237 polypharmacy cases, 174 (74%) were in cardiac or endocrine department (Figure 3). This make cardiology department higher in polypharmacy cases (Patrick et al., 2013). Our study results shows that out of 300 patients 183 were received unnecessary drug treatment and only 117 were received proper therapy. Out of 183 unnecessary drug treatment case, 120 were in cardiology and endocrine diseases department (Table 7). Prevalence of cardiovascular diseases makes this result and the urgency also made a contribution. Out of 183 unnecessary treatment received cases, 110 were prescribed with gastrointestinal drugs (Table 8). Results shows that gastrointestinal drugs especially ranitidine make more contribution to unnecessary treatment followed by cardiovascular drugs.

Our study result shows that the reason for unnecessary treatment is the prescription of drug without any specific indication. Out of 183 case 117 cases were belongs to this category (Figure 4). The unnecessary treatment with no medical indication can be explained like this in a cardiovascular case; ranitidine prescribed to prevent side effect/prophylactic therapy in low dose aspirin in patient without peptic ulcer history. This problem classified into "prescribing cascade". The "prescribing cascade" begins when an adverse drug reaction is misinterpreted as a new medical condition. Another drug is then prescribed, and the patient is placed at risk of developing additional adverse effects relating to this potentially unnecessary treatment (Bushardt et al., 2008).

### Limitations

- Our study period was restricted and it was only 6 months.
- The study had limitations due to its small sample size (n=300 only) and the fact that there were no data on any non-prescription drugs and supplements taken, as this information was not available in the medical records.
- Extrapolation of our findings to different populations, ethnic groups and urban populations in India may be inappropriate.

**Table 1: Gender wise distribution in the study population**

Gender	Number of patients(n=300)	Percentage (%)
Male	139	46
Female	161	54

**Table 2: Age wise distribution of study population**

Age groups	Number of patients (n=300)	Percentage (%)
61-65 yrs	102	35.5
66-70 yrs	82	25
71- 75 yrs	47	16
76-80 yrs	31	10
81-85 yrs	21	7.2
86-90 yrs	12	4.5
91-95 yrs	05	1.8

**Table 3: Reason for admission in study population**

Reason for admissions	Number of patients (n=300)	Percentage (%)
Cardiovascular diseases	139	45
Endocrine diseases	57	20
Neurological diseases	19	06
Respiratory diseases	52	18
Musculoskeletal diseases	14	04
Gastrointestinal diseases	16	06
Psychiatric diseases	03	01

**Table 4: Comorbidities of study population**

Comorbidities	Number of patients (n=300)	Percentage (%)
Hypertension	77	26
Hyperlipidemia	08	02
Diabetes mellitus	66	23
Hypertension with diabetes	125	41
Hypertension with hyperlipidemia	21	07
More than 2 comorbidities	03	01

**Table 5: Length of hospital stay**

Number of days	Number of patients (n=300)	Percentage (%)
1-3 days	98	34
4-6 days	150	50
7-9 days	30	10
10-12 days	19	06
More than 12 days	03	01

**Table 6: Frequently prescribed drugs in study population**

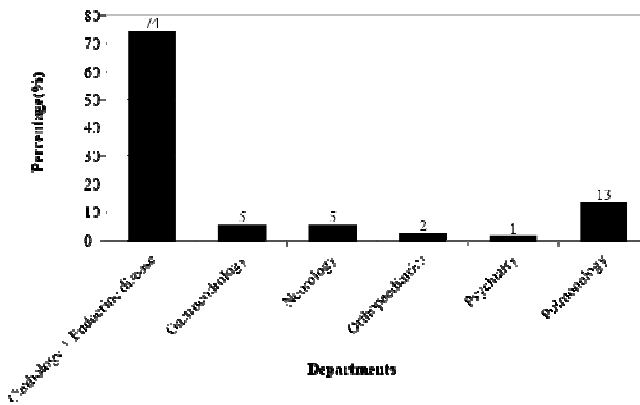
Drug classification	Number of patients (n=300)
Anti hypertensives	221
Anti diabetics	190
Dyslipidemic	165
Anti coagulants	140
Anti platelet6	134
Anti epileptics	30
Anti psychiatrics	10
NSAIDs	167
Anti-ulcer drugs	285
Nutritional supplements	170

**Table 7: Unnecessary drug therapy in different departments**

Departments	Number of patients(n=183)	Percentage (%)
Cardiology & Endocrine disease	120	66
Gastroenterology	08	04
Neurology	14	07
Orthopaediatrics	05	02
Psychiatry	03	01
Pulmonology	33	20

**Table 8: Distribution of medication associated with unnecessary drug therapy**

Drug classification	Number of patients (n=183)
Cardiovascular drugs	93
Anti diabetics	08
Gastrointestinal drugs	110
Neuromuscular agents	05
Respiratory drugs	07
Nutritional supplements	32
Anti psychiatrics	03
NSAIDs	32

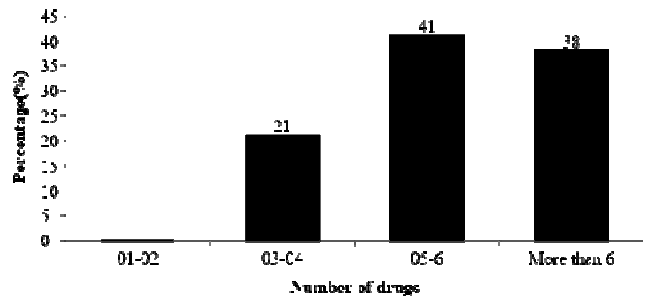


**Figure 3: Polypharmacy in different departments**

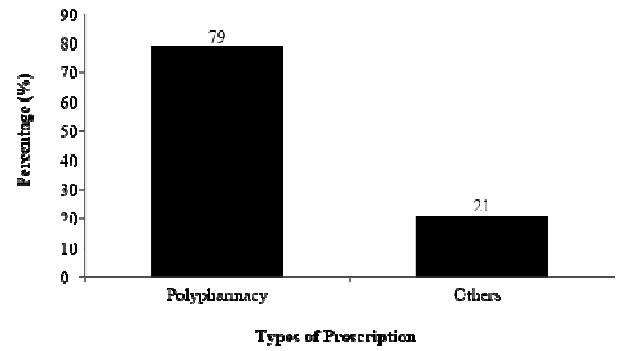
**Conclusion**

The elderly population in India is continues to rise and the pharmacologic management of many acute and chronic conditions in this population have contributed to increase medication use among them and this situation may lead to polypharmacy and unnecessary drug therapy.

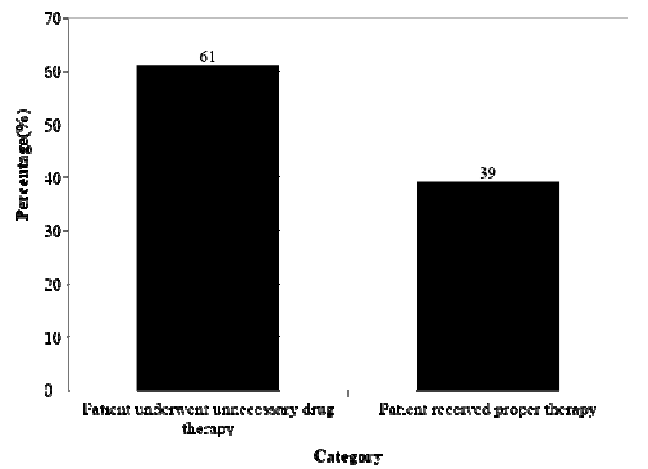
Our study reveals that, cardiovascular diseases were the major reason for admission in elderly population and the reason behind this is our sedentary life style. The study reveals an interesting fact that, all the patients have one or more comorbidities. Our study evidence leads to the conclusion that most of our geriatric population experiences polypharmacy, at least once in their life. Majority of our



**Figure 1: Number of average drugs prescribing per day**



**Figure 2: Number of Prescription with Polypharmacy**



**Figure 4: Unnecessary drug therapy in study population**

geriatric population undergoing unnecessary drug treatment, and the main class of drug behind this effect was gastrointestinal drugs, especially ranitidine in this study. Prevention of polypharmacy and unnecessary drug therapy in geriatric population can be conducted through reduction of drug use and it is recommended to eliminate all medications without therapeutic benefit, goal or indication. Prevention of unnecessary drug therapy will also contribute in cost saving among elderly patients.

This study explores the clear need for monitoring and educating elderly patients, particularly in terms of clarifying the prevalence of poly-pharmacy and the potential roles of healthcare professionals in successfully introducing new and reviewing existing drug therapy.

### Conflict of Interest

No conflict of interest.

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