POLYPHARMACY AND POTENTIALLY INAPPROPRIATE MEDICATION USE IN GERIATRIC PATIENTS

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ABSTRACT

A 6 months prospective study was conducted at medicine department of KIMS Hospital in Bangalore, to study the incidence of polypharmacy among the geriatric patients. The assessment of appropriateness was done by using BEER'S criteria 2012 and WHO prescribing indicators.

During the study period, out of 209 patients there were 18 prescriptions (8.61%) categorized as minor polypharmacy and 187 prescriptions (89.47%) as major Polypharmacy. Most of prescriptions with polypharmacy were found among male patients.

In our study the total number of drugs prescribed was 1888. The average number drugs prescribed per prescription are an important index of the standard of prescribing. The number of drugs per prescription in our study was found to be 9.03 ± 3.64. The number of drugs prescribed by generic names was only 1.53%.

10.01% of patients were prescribed with antibiotics. 10.43% of patients were prescribed with injections which are high compared to ideal standards. 52.59% of drugs were prescribed from the WHO essential drug list.

In our study 13 drugs were found as inappropriate medications according to Beer's Criteria 2012. Nitrofurantoin, chlorpheniramine followed by amitriptyline were most frequently prescribed inappropriate drugs. Drugs to be avoided in certain diseases are mainly associated with CCF followed by PKD. There is a need for mass awareness among physicians, pharmacists and patients about the concept of rational use of medications.

Keywords: Polypharmacy, Inappropriate Medication, Geriatric Patients, KIMS Hospital Bangalore

INTRODUCTION

People aged greater than 60 years are one of the most rapidly growing age group in the world. Many older adults have multiple medical conditions such as hypertension, arthritis, heart diseases, cancer and diabetes mellitus which require multiple medications for proper treatment1

Polypharmacy is classified according to BRITISH NATIONAL FORMULARY (BNF) as the concurrent use of 2-4 drugs and are classified as minor poly pharmacy and of 5 or more drugs as major Polypharmacy 2.

Geriatrics is the branch of medicine which aims to promote health by preventing and treating diseases and disabilities in older adults3. World Health Organization (1963) has defined 'middle-age' as being 45-59 years, 'elderly' as being 60-74 years and the 'aged' as over 75 years of age3.

Polypharmacy is particularly common among older adults around 20% of people over 70 years in the western world were taking five or more drugs3. Polypharmacy 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 prescribing physicians, availability of nonprescription drugs, high cost of prescription medications, hoarding of old medications, inadequate patient knowledge of medications and medical conditions, patients using different sources of medication, often with little or no co-ordination between these sources, taking at least one medication for every diagnosis and tendency towards self-medication4. Intervention to reduce Polypharmacy must address several issues such as appropriate medication usage in elderly, including appropriate indication, drug-drug duplication in the same class of therapeutics, inappropriate and complex dosing, drug-drug interaction, drug disease interaction, drug-food interaction, coordination of the medication between primary care provider and specialists, use of drug holidays, and education of members regarding adverse drug effects and other uses related to compliance. Polypharmacy may be also responsible for unnecessary health expenditures directly due to the cost of superfluous medication but also due to increased number of hospitalization caused by drug related complications2. In-appropriate prescription of medications in elderly due to wrong dosing, incorrect frequency of administration, prescribing ineffective medication, prescribing the wrong medication and duplicate therapy also leads to many ADRs. About one fourth of the ADRs are due to in-appropriate

prescriptions inelderly. Many studies have shown that inappropriate medication use in elderly as per Beer's list leads to increased morbidity and mortality4. Poly pharmacy increases the risk of hospitalization, and medication errors. These factors eventually lead to increased patient costs, non-adherence to the treatment, increased rate of patient morbidity and mortality. Poly pharmacy may be responsible for unnecessary health expenditures directly due to the cost of superfluous medications, but also indirectly due to increased number of hospitalizations caused by drug related problems2. There are 3 major categories of inappropriate prescribing: over-prescribing, under-prescribing and misprescribing. Overprescribing can be defined as the prescription of more medications than are clinically indicated. Misprescribing is defined as the prescription of medications that does not agree with accepted medical standards. In other words, a medication is indicated but prescribed incorrectly. Misprescribing refers to several aspects of prescribing such as: choice of medicine, dose, and modalities of administration, duration of therapy, drug interactions, monitoring, and cost. Under prescribing – an aspect of inappropriate prescribing that has long been underestimated - is the omission of drug therapy that is indicated for the treatment or prevention of a disease

or condition. Avoiding the use of inappropriate and high-risk drugs is an important, simple, and effective strategy in reducing medication-related problems and ADR's in older adults.Methods to address medication-related problems include implicit and explicit criteria. Explicit criteria can identify high-risk drugs using a list of PIMs that have been identified through expert panel review as having an unfavorable balance of risks and benefits by themselves and considering alternative treatments available. A list of PIMs was developed and published by Beers and colleagues for nursing home residents in 1991 and subsequently expanded and revised in 1997 and 2003 to include all settings of geriatric care. Implicit criteria may include factors such as therapeutic duplication and drug–drug interactions7.

METHODOLOGY

A 6 months prospective study was conducted at medicine department of KIMS Hospital and Research Centre in Bangalore. Prescriptions were collected during ward rounds from case sheets and hospital records of inpatient, who have fulfilled the inclusion and exclusion criteria. A data collection form (annexure 1) was designed for collection of required data from the case sheet and patient's hospital record. Totally 209 inpatient prescriptions were collected from the department of general medicine

between January 2014 to May 2014. Collected prescriptions were entered into a Microsoft excel sheet according to their age, gender, therapeutic category, no. of drugs per prescriptions, length of hospital stay and prescription details were scrutinized and were classified as major (concurrent use of 5 or more drugs) or minor Polypharmacy (concurrent use of 2-4 drugs)2.

The collected prescriptions were analyzed using BEER's Criteria and WHO prescribing indicators.

INCLUSION CRITERIA:

1. Patients of either gender greater than or equal to 60 years

2. Patients who are on 3 or more drugs.

EXCLUSION CRITERIA:

1. Topical and herbal medications are excluded.

2. Vitamins and minerals in the prescription are excluded3.

BEER'S CRITERIA7, 8:

The American geriatrics society (AGS) and work of an interdisciplinary panel of 11 experts in geriatric care and pharmacotherapy has applied a modified Delphi method to develop this criteria. Improving the quality of care for all older adults has been the mission of the AGS since its founding in 1942.

Prescriptions were categorized based on the appropriateness of medication prescribed, by Beer's criteria 2012 which categorizes the medications as:

a. Potentially inappropriate medications and classes to avoid in older adults

b. b. Potentially inappropriate medications and classes to avoid in older adults with certain diseases and syndromes that the drugs listed can exacerbate

c. c. Finally medications to be used with caution in older adults.

WHO Prescribing Indicators10:

This indicators can be quickly and efficiently used in many settings to assess potential problems in drug use, and to prioritize and focus subsequent efforts to correct these problems

The Prescribing Indicators Are:

1. Number of drugs per prescription.

2. Number of drugs prescribed by generic name.

3. Number of antibiotics prescribed per prescription.

4. Number of injections per prescription at the day of admission.

5. Number of drugs prescribed from WHO essential drug list or formulary.

After analyzing the prescriptions according to both BEER'S Criteria and WHO prescribing indicators the results were analyzed using descriptive statistics. Mean and SD were used to describe the results wherever applicable.
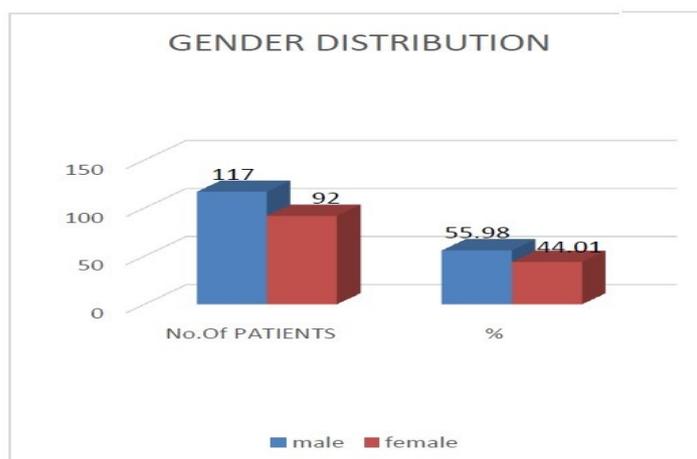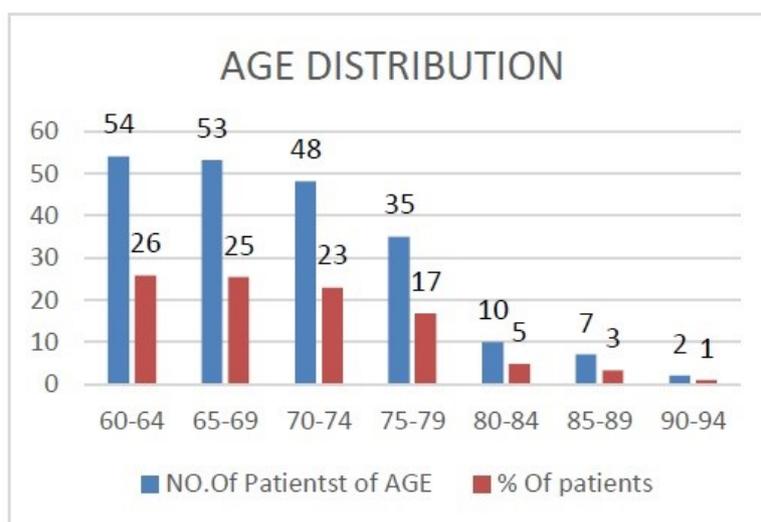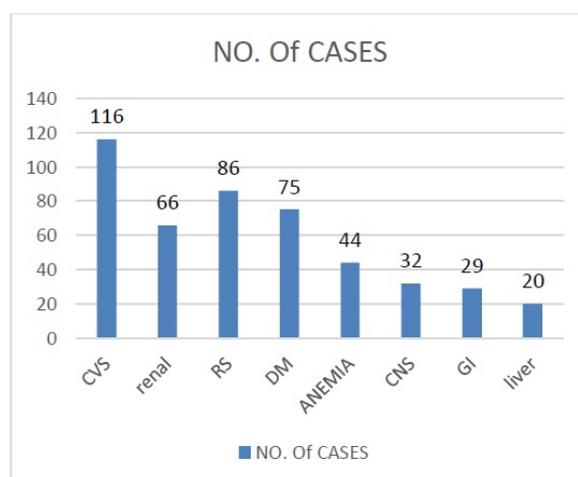
RESULTS

Figure 1

Figure 2
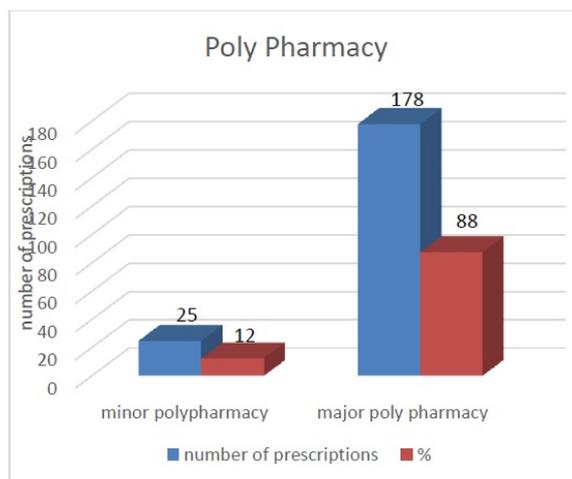

Figure 3

Figure 4
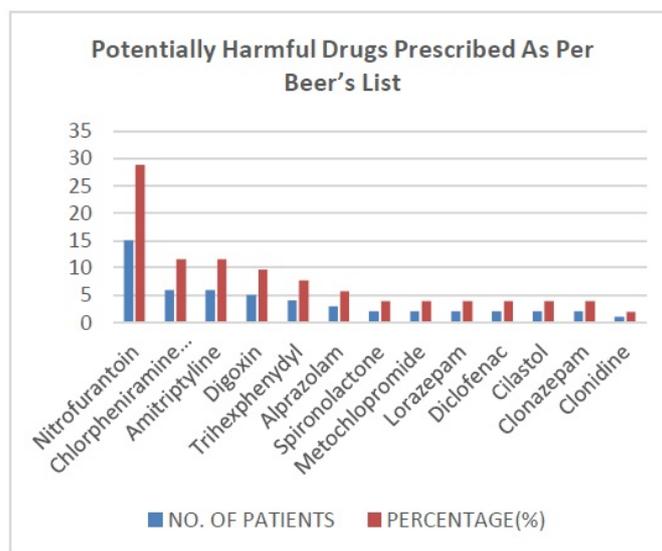
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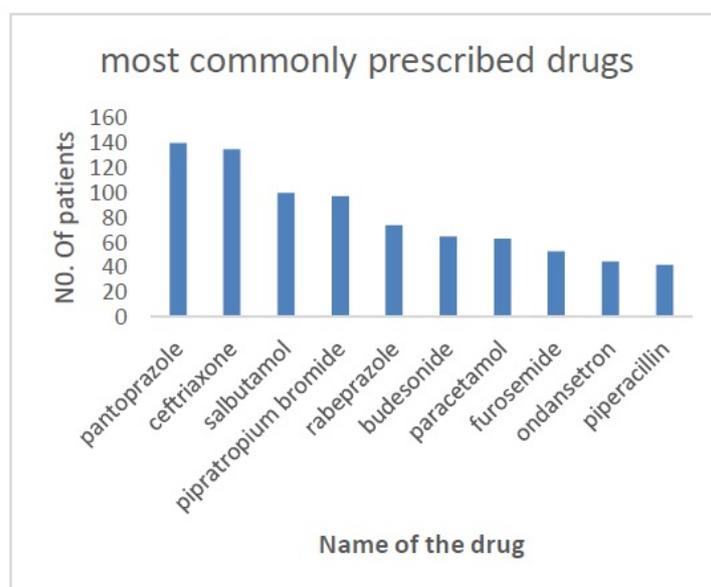
Figure 6

Table No. 1

PRESCRIBING INDICATORS ASSESSED	TOTAL DRUGS/ ENCOUNTERS	AVERAGE/ percent	Standard or ideal
Average number of drugs per encounter	1888	9.03	1.6 – 1.8
percentage OF ENCOUNTERS WITH ANTIBIOTICS	189	90.43%	20.0 – 26.8%
Percentage of drugs prescribed by generic names	29	1.54%	100%
Percentage of encounters with injection	197	94.26%	13.4 – 24.1%
Percentage of drugs from essential drug list	993	52.60%	100%

DISCUSSION

Polypharmacy mainly depends on the type of the disease and co-morbid conditions. The majority of drug users exposed to polypharmacy exhibited very heterogeneous pattern of drug combination and mostly individuals subject to major polypharmacy had their own unique drug combination, different from all other drug users.

In this study we used hospital case sheets of patients for the estimation of incidence and prevalence of polypharmacy.

In our study a total of 209 patients were admitted to the study, out of which 117 patients were male (55.98%) and 92 patients were female (44.02%) (Figure 1)

The mean age of patients was 69.19 years ranging between 60-90 years.25.84percent of patients were between 60-64 years which was the most prevailing age group in both genders.

In our study, there were 18 prescriptions (8.61%) categorized as minor polypharmacy i.e with 2-4 drugs per prescription and 187 prescriptions (89.47%) as major Polypharmacy i.e with ≥5 drugs per prescription (Figure 4)

Poly Pharmacy Vs Gender:

Overall poly pharmacy was more in males than females. In minor Polypharmacy (N=18), 12 were males and 6 were females. Out of 187 prescriptions with major polypharmacy 102 were males and 85 were females. Figure no: 1 explains the prevalence of Polypharmacy in both genders in our study populations.

Poly Pharmacy Vs Age:

72.22% of minor Polypharmacy was seen between the age group of 60 – 70 years followed by the age group between 71 – 80 (16.66%). 50.26% of major Polypharmacy was seen between the age group of 60 – 70 followed by 71 – 80(40.64%).(Figure no:2)

Polypharmacy Vs Hospital Stay:

The association of polypharmacy and length of hospital stay was analyzed. In both major and minor Polypharmacy, length of hospital stay was on an average less than 1 week (figure no: 6). The average

length of hospital stay in our study population was 5.57 days ranging between 1 – 16 days. Overall 1888 drugs were prescribed to 209 geriatric patients (range between 1 – 20 drugs).

The most common disorders found were-Cardio vascular disorders with 117 prescriptions (24.78%) in which 94 prescriptions (81.03%)of hypertension was found most prevailing followed by 20 prescriptions (17.24%) of IHD, 14 prescriptions (12.06%) of CVA and 2 prescriptions (1.72%) of CCF.

Respiratory disorders were the second most prevailing disorder with total of 86 prescriptions in which 40 prescriptions (46.51%) of COPD, 13 prescriptions (15.11%) of bronchitis and 12 prescriptions (16.02%) of asthma.

Diabetes were the third most prevailing disorder with 75 prescription (16.02%) followed by renal disorders with 66 prescriptions (31.57%) in which with 35 prescription(53.03%) of urinary tract infection was the most prevailing followed by 13 prescriptions (19.69%) of chronic kidney disorder, 5 prescriptions (7.57%) of cholesthiasis, 4 prescriptions (6.06%) of nephropathy, and 2prescriptions (3.03%) of acute renal failure.

Anemia with 44 prescription (21.05%) in which most prevailing was 20 prescriptions (45.45%) of iron deficiency anemia, 10 prescriptions (22.72%) of microcytic hypochromic anemia, 4 prescriptions (9.09%) of dimorphic anemia. Central nervous system disorders were with 32 prescriptions (15.31%) in which the most prevailing disorder was with 12 prescriptions (37.5%) of parkinson's disease, 6 prescriptions (18.75%) of seizures, 5 prescriptions (15.62%) of neuropathy.

Gastrointestinal diseases with 29 prescriptions (13.80%) in which was the most prevailing with 16prescriptions (55.17%) was of gastro enteritis followed by with 3 prescriptions (10.34%) of Gastroesophageal reflux disease.

Liver diseases with 20 prescriptions (9.56%) in which the most prevailing diseases were with 2 prescriptions (10%) of liver cirrhosis, 2 prescriptions (10%) of alcoholic liver disease and 1 prescription (5%) of polycystic liver disease.

(Figure no: 3)

Most commonly prescribed drugs in our study among the geriatric populations were Proton pump inhibitor especially pantoprazole was the commonly prescribed anti-ulcer drug in 140 patients followed by antibiotics with ceftriaxone in 135 patients, salbutamol (100 patients), Ipratropium bromide Furosemide (97 patients), rabeprazole (74 patients), budesonide (65

patients), paracetamol (63patients), furosemide (53 patients), Ondansetron (45 patients), piperacillin (42 patients). (Figure No.6)

BEER's Criteria:

The BEER'S list is a list of specific medications that are generally considered inappropriate when given to geriatric population. For a wide variety of individual reasons, the medications listed tend to cause side effects in elderly due to physiologic changes of ageing6.

In our study 47 prescriptions (22.49 %) were found to have inappropriate medications according to Beer's Criteria 2012 involving 13 drugs.

In our study nitrofurantoin, chlorpheniramine followed by amitriptyline were most frequently prescribed inappropriate drugs.

Drugs to be avoided in certain diseases are mainly associated with CCF followed by PKD. The analysis revealed that 22.49% of the overall prescriptions was categorized as inappropriate and 77.51% was categorized as appropriate prescription. The drug have to avoided in the geriatrics as described in the Beer's criteria and drugs that were inappropriately prescribed in our study were also identified and given in the Figure No.5.

WHO Prescribing indicators: The details of drugs collected were analyzed according to WHO indicators for the Number of drugs per prescription, number of drugs prescribed by generic names, number of drugs prescribed from WHO list of essential medication, number of injections per prescription and number of antibiotics per prescription.

In our study the total number of drugs prescribed was 1888. The average number drugs prescribed per prescription are an important index of the standard of prescribing. The number of drugs per prescription in our study was found to be 9.03 ± 3.64. This shows that there is a scope for improving prescribing practices by educational interventions in our hospital.

Prescribing by generic name can reduce the cost incurred on drugs and risk of medication errors. Excess of prescribing by brand names may be considered as evidence of vigorous promotional activities by pharmaceutical companies. The number of drugs prescribed by generic names was only 1.53%.

10.01% of patients were prescribed with antibiotics which comply with ideal standard. The number of antibiotics prescribed should be as low as possible and should be prescribed for appropriate medical indication. 10.43% of patients were prescribed with injections which lie between ideal standard values. Excessive use of injections consumes scarce nursing

resources and increases the risk of spread of infections. (Table No.1)

CONCLUSION

Our study suggests that current practice in our hospital is associated with greater Polypharmacy and inappropriate medication use. A regular medication chart review by clinical pharmacist to discontinue unnecessary medication will reduce the cost of therapy and help in improving patient care. In future multidisciplinary approach should be taken involving nurses, pharmacists, and physicians and pharmacist to work as team for bringing out rational drug use in geriatric population.

The prescribing practice for antibiotics, injections, average number of drugs, percentage of drugs prescribed by generic name and percentage of drugs prescribed from essential list shows a deviation from the standards recommended by WHO.

The therapeutic classes involved in inappropriate prescribing differ from one study to another. These observations may have important implications with regards to need for improving prescribing practices by the implementation of protocols and hospital guidelines that could result in cost saving and less adverse effects.

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