

# Prescribing Pattern of Drugs in Geriatrics Patients Using Beers Criteria

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## ABSTRACT

**Background:** Geriatric people particularly those with multiple co-morbid condition may result in polypharmacy which can be associated with use of potentially inappropriate medication. This study aims to understand about prescription pattern and to find out inappropriate medication used in geriatric patients using Beer's criteria 2012.

**Methods:** A cross sectional study was conducted from May 2018 to Aug 2018 in Koshi Zonal Hospital in Biratnagar. Data of all elderly patients greater above or equal to 60 years those were admitted to General Medical Ward during this period was analyzed.

**Results:** Eighty-six percent of the prescriptions were appropriate and 14% were inappropriate. Seventy-seven percent of drugs belong to Group I of Beer's criteria (Potentially inappropriate medication use in older adults), 23% of drugs belong to Group III (Potentially inappropriate medication to be used with caution in older adults) and no drugs fall under Group II (Potentially inappropriate medication use in older adults due to Drug-Disease or Drug-Syndrome interactions that may exacerbate the disease or syndrome) of Beer's criteria.

**Conclusions:** Potentially inappropriate medication was found out to be 14%. The use of inappropriate medications can be avoided using Beer's criteria 2012 which is important clinical tool that can be used by physicians, pharmacist and other health care professionals.

**Keywords:** Beer's criteria; geriatric; potentially inappropriate medication; prescribing pattern.

## INTRODUCTION

Geriatric people particularly those with multiple co-morbid condition often accompanied by use of multiple medicines that can lead to polypharmacy.<sup>1</sup> As polypharmacy is common phenomenon seen in elderly population, it can be associated with use of Potentially Inappropriate Medication (PIM).<sup>2</sup> A person on PIM is associated with potential drug related problem and increase in healthcare cost and utilization compared to those people who are not on PIM.<sup>3</sup> One of the most widely used measures of appropriateness of prescribing with a compilation of medication to be inappropriate in Geriatric people is commonly known as Beer's criteria.<sup>4</sup> American Geriatric Society (AGS) 2012 Beer's criteria have been developed to assist healthcare practitioner to improve medication safety and quality of care in older adults and reduce their exposure to potentially inappropriate medication.<sup>5</sup> This study aims to understand about prescription pattern and to find out

inappropriate medication used in geriatric patients using Beer's criteria 2012.

## METHODS

A prospective cross sectional study was conducted at General Medical Ward of Koshi Zonal Hospital from May 2018-Aug 2018. Ethical approval was obtained from Nepal Health Research Council (NHRC). Two-hundred patients those who were above or equal to 60 years and were willing to participate were included in the study. The formal and informal permission from concerned authority of Hospital (Medical Superintendent, Head of Medical Department and Head of Nursing Department) were taken. Patients were identified with help of the health service provider such as nurses. The verbal consents from the patients were taken prior the conductance of research and patients were selected using convenience sampling technique.

Data were collected by using self developed data

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collection form. The data collection form contained the information like age, sex, date of admission, date of discharge, disease state, reason for admission, history (medical, social, family, allergies, medication), vital signs and medicine used.

The obtained data was entered in IBM SPSS (International Business Machine Statistical Package of Social Science) version 20 and MS EXCEL (Microsoft Excel) 2007. Data analyzed include the result on demographic of patients (age, sex, and length of stay in hospital), major disease diagnosed, number of medication per prescription, categorization of drug prescribed. Categorization of drug was done according to Nepalese National Formulary (NNF).<sup>6</sup> The data was thoroughly analyzed to evaluate inappropriateness in geriatric patient using Beer's criteria 2012. 2012 AGS Beers criteria consist of 53 medications divided into 3 groups; first group of drug are those that are potentially inappropriate for the use in older adults. The second group consists of PIM use in older adults due to Drug-Disease or Drug-Syndrome interactions that may exacerbate the disease or syndrome and finally third group consists of the list of those drugs that have to be used with caution in older adults.<sup>5</sup> All the data results were presented using tables, pie chart for the interpretation of the data.

**RESULTS**

Out of 200 elderly patients, 105 (52.5%) were male and 95 (47.5%) were female. 120 (60%) elderly patients were in the age group 60-69 years. 104 (52%) patients stayed for a period of 5-9 days and 124 (62%) elderly patients were prescribed in a range of 5-9 drugs. In this study 51 (25.5%) of elderly patients were admitted to medical ward due to chronic obstructive pulmonary disease (COPD) and drug used in infection (24.4%) were most common categories of drug prescribed to elderly patients.

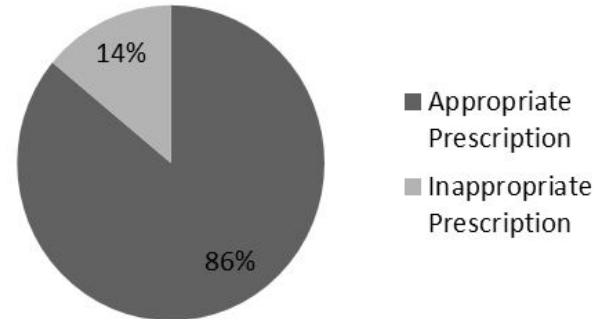
Out of 200 prescriptions screened, 172 (86%) prescriptions were seemed to be appropriate and the remaining 28 (14%) were inappropriate as per Beers criteria 2012 (Figure 1) i.e. 172 prescriptions didn't contained the drug listed on Beers criteria or comply with Beers criteria list and remaining 28 prescriptions either contained the drug listed on Beers criteria or didn't comply with Beers criteria list. The drugs prescribed inappropriately as per Beers criteria 2012 were Metoclopramide (8), Clonazepam (7) and others (Table 1).

Categorization of drug according to Beer's criteria showed that maximum number of drugs (77%) that were inappropriate fall under Group I (Drugs which are considered to be potentially inappropriate in older

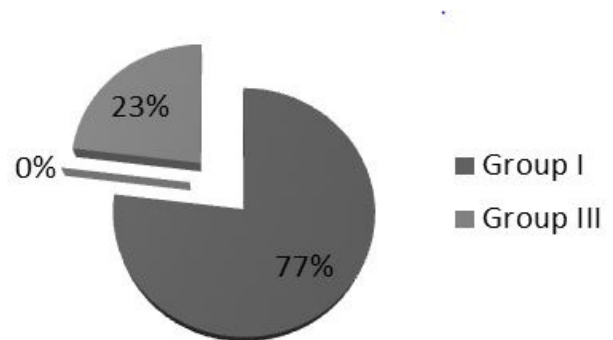
adults) and least number of drugs (23%) that were inappropriate fall under Group III (Drugs to be used with caution in older adults) whereas, no drugs were prescribed under Group II (PIM use in older adults due to Drug-Disease or Drug-Syndrome interactions that may exacerbate the disease or syndrome) (Figure 1).

**Table 1. Inappropriate drug identified in prescription as per Beers criteria 2012.**

Drugs under Beer's Criteria	Frequency of Occurrence
Diazepam	2
Clonazepam	7
Alprazolam	2
Lorazepam	2
Spironolactone	3
Metoclopramide	8
Prazosin	1
Cyproheptadine	1
Aspirin	3
Ketorolac	1
Mirtazapine	1
Duloxetine	2
Digoxin	1



**Figure1. Evaluation of prescription using Beer's criteria 2012.**



**Figure 2. Categorization of drug according to Beer's criteria.**

The inappropriate drugs identified were categorized under following groups as per Beers criteria:

Group I - Drugs which are considered to be potentially inappropriate in older adults.

Group II - PIM use in older adults due to Drug-Disease or Drug-Syndrome interactions that may exacerbate the disease or syndrome.

Group III - Drugs to be used with caution in older adults.

The drugs that were prescribed under Group I were; Alprazolam, Clonazepam, Lorazepam, Diazepam, Digoxin, Spironolactone, Metoclopramide, Cyproheptadine, Prazosin and Ketorolac. The drugs that were prescribed under Group III were; Aspirin, Duloxetine and Mirtazapine and whereas, no drugs were prescribed under the Group II.

## DISCUSSION

The present study showed that out of 200 prescription screened, 14% of prescription were inappropriate. Similar studies have reported a prevalence of PIM to be 13%.<sup>7-8</sup> Some other studies done in Lebanon<sup>2</sup> and Brazil<sup>9</sup> have reported an inappropriate medication to an extent of 45.2% and 44.2% respectively. Few studies carried in Nepal<sup>10</sup> and India<sup>11</sup> has reported lower PIM than this study. This difference in prevalence of PIM reported in various studies can be due to type of study design undertaken by various studies and also can be due to nature of occurrence of disease in patients. Likewise, differences in patients characteristics, prescribing pattern and availability of drug listed in 2012 AGS Beers criteria may also be another contributing factor for variation in prevalence.<sup>12</sup>

The most commonly prescribed PIM observed in this study was Metoclopramide (as per Beers criteria group I) and Clonazepam (as per Beers criteria group I). Metoclopramide has a chance of causing extra pyramidal effect including tardive dyskinesia, further risk may be increased in frail older adults likewise, and Clonazepam is associated with increased risk of cognitive impairment, delirium, falls, fracture and motor vehicle accident in geriatric. Metoclopramide should be avoided unless for gastro paresis and Benzodiazepine may be appropriate for seizure disorder, rapid eye movement sleep disorder, benzodiazepine withdrawal, ethanol withdrawal, severe generalized anxiety disorder, periprocedural anesthesia and end of life care.<sup>5</sup> however such condition has not been found in this study which makes them to fall under PIM category. A safer alternative should be considered

while prescribing drug to elderly patient. A study done on Korea found Alprazolam and Clonazepam to be most highly prescribed PIM in elderly<sup>12</sup> whereas, in this study Metoclopramide and Clonazepam were found most highly prescribed PIM in elderly which was similar in case of Clonazepam but contrary in case of Metoclopramide.

Further no drugs were found that need to be avoided in older adults that may exacerbate the disease or syndrome due to Drug-Disease or Drug-Syndrome interactions, which can be related to quality prescribing by doctors towards elderly patients. Majority of the disease diagnosed among elderly was COPD which is contrary to the study done on Northern Ethiopia.<sup>13</sup> In this study, Drugs used in Infection was major categories of drug prescribed to elderly which is contrary to a study done on India.<sup>14</sup> this difference can be due to the use of different method for classification of drugs.

Further most of the prescription had 5-9 drugs. Since, the average length of stay of elderly patient in hospital was also higher (5-9 days) which means more medicine were prescribed and administered. So in this case, polypharmacy can be justifiable.<sup>15</sup>

Presence of multiple co-morbid conditions makes elderly, highest consumer of drugs.<sup>16</sup> As polypharmacy is common phenomenon seen in elderly it can be associated with adverse drug reactions or drug interactions and further increase the healthcare cost.<sup>3,12</sup> So, a high degree of caution is required while prescribing drugs to elderly population. One of the tools which provide guidelines for safer prescribing in elderly is Beer's criteria which was developed in year 1991 and subsequently updated in year 1997, 2003, 2012 and 2015. Beer's criteria can assist healthcare practitioner to improve medication safety and quality of care in older adults and reduce their exposure to PIM.<sup>4,17-19</sup>

Since this study had enrolled 200 geriatric patients who were admitted to General Medical Ward of Koshi Zonal Hospital this study cannot be generalized for whole country. Further, this study didn't use updated version of AGS Beers Criteria 2015 which is considerably comprehensive list and has new category of PIM depending on creatinine clearance and drug-drug interaction.<sup>19</sup> A similar study can be done on larger sample with more than one hospital for generalization within Nepal and on geriatric outpatients or those who are admitted to Intensive care unit. Further, introducing a specialty of geriatric medicine in our country is indispensable in order to safeguard geriatric population from exposure of PIM. In addition to Beers criteria's various list of PIM for elderly such as STOPP/START (Screening tool for older

person potentially inappropriate prescription/ Screening tool to alert doctors to right treatment), Medication Appropriateness Index (MAI) has been developed and such list should always been considered while providing therapy to elderly patients.<sup>20-21</sup>

## CONCLUSIONS

The study is focused on assessing prescribing pattern as per Beer's criteria 2012 in geriatric patients. It is aimed at improvement of prescribing towards geriatric patient so that inappropriate medication can be minimized.

In this study, use of potentially inappropriate medication was found to be 14%. This study recommends using Beer's criteria 2012 which is one of the important tools that can be used by physicians, pharmacist and other health care professionals to avoid use of PIM in elderly. Beer's criteria can act as guideline to the prescriber while prescribing the drug to geriatric patients. It can be useful to pharmacist in assessing the appropriateness of prescription before dispensing to geriatric patients and suggesting a safer alternative by consulting with physician so that proper decision is made regarding the appropriate choice of drug in elderly population.

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