Evaluation of Appropriateness of Geriatric Prescriptions Based on Beers and START STOPP Criteria

Haritha S. Nath¹, Ann Tejas Abraham¹, Kilincy Nongrum¹, Chethan Subramanya², Sharad Chand³, Nandakumar U.P.¹, Sophia M George¹, Juno J. Joel*¹

¹Nitte (Deemed to be University), NGSM Institute of Pharmaceutical Sciences (NGSMIPS), Department of Pharmacy Practice, Mangalore, India
²Nitte (Deemed to be University), KS Hegde Medical Academy (KSHEMA), Department of General Medicine, Mangalore, India
³Department of Pharmacy Practice, Amity Institute of Pharmacy, Amity University Uttar Pradesh, Noida, India
⁴Department of Pharmaceutical Sciences, School of Health Sciences and Technology, Dr. Vishwanath Karad MIT World Peace University, Pune, Maharashtra, India

*Correspondence
Dr. Juno J Joel
Department of Pharmacy Practice, NGSM Institute of Pharmaceutical Sciences, Nitte (Deemed to be University), Paneer, Deralakatte, Mangaluru, Karnataka, India
E-mail: junojoel@nitte.edu.in

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ABSTRACT

Background/Purpose: The main purpose of this study is to analyse the prescription pattern among geriatrics by using Beers and the START/STOPP criteria and to assess the frequency of poly-pharmacy in geriatric patients.

Methods: A prospective study of eight months was conducted among the elderly in-patients aged above 65 years old. Patient’s demographics, diagnosis, and details on drug therapy were documented. Inappropriateness of prescription were analysed using AGS 2015 Beer’s and STOPP/START criteria and further comparison was done between both criteria. The frequency of polypharmacy was documented and analysed.

Results: A total of 385 patients were enrolled as per the inclusion criteria. While analysing 385 prescriptions, it was found that 73 (19.0%), 16 (4.2%) and 52 (13.5%) prescriptions were inappropriate according to STOPP criteria, START criteria and Beer’s criteria respectively. 34.0% of the total prescriptions had major polypharmacy, 46.5% with minor polypharmacy and no polypharmacy was observed in 19.5% of the prescriptions. Majority of the patients were diagnosed with hypertension (n (%) = 228(59.2%)), followed by diabetes (n (%) = 150 (39%), COPD (n (%) = 92 (23.9%) and the most inappropriately prescribed drugs were clonidine (n (%) = 16 (4.2%)), followed by prazosin (n (%) = 11 (2.9%)) and lorazepam (n (%) = 7 (1.8%).

Conclusion: The inappropriateness of medication was directly proportional to the number of medications. It vividly states that polypharmacy can be one of the main reasons to bring forth inappropriateness in prescription.

1. INTRODUCTION

The global population of older adults is on a rise and it is growing at an unparalleled rate. Out of the total population of about 617 million worldwide, about 8.5% are aged sixty-five and above. According to the reports of recent researches performed, it is expected that by 2050, the current 8.5%would
spike up to 17%. An exponential increase in the public health along with other comorbidities has been reported. The elderly population have at least five or six comorbidities, which result in great health challenges.\(^1\)

Geriatric medicine is the branch of medicine which deals with the clinical or medical aspects of gerontology, and it aims to provide better and updated information regarding the medication and the prescription pattern among older adults.\(^2,3\) With the growing population of the elderly, there has been a proportional increase in the demand for urgent care and treatment. Serious health conditions demanding treatment are often displayed among those aged above 80 years.\(^4,5\) The geriatric population has also displayed considerable social and financial challenges and is putting a great stress on the resources and infrastructure of the health care system. The probability of geriatrics being diagnosed with communicable and non-communicable diseases is equal and, it mandates vigilant screening and specific treatment as well. According to the population census data of 2011, it was observed that 73.3% of Indian elderly population reside in rural areas, possess poor knowledge and access to quality healthcare services. Thus, proper education needs to be imparted to these patients and necessary instructions have to be given to both patients and care-takers as well regarding the use of medical devices.\(^4,6\)

Certain changes that can be seen along with aging are: a change in the GI absorption, absorption from the skin is reduced and fat soluble drugs undergo slower elimination. Renal function is impaired and glomerular filtration is reduced.\(^7\) Thus, as age progresses, the pharmacological parameters of a drug will also change leading to a prolonged duration of action, altered drug effect and increased rate of drug toxicity and adverse drug reaction.\(^8\) These age-related changes in the pharmacokinetics and pharmacodynamics parameters, in addition to the comorbidities and polypharmacy, puts elderly patients at a serious risk of adverse drug reactions and adverse drug events.\(^9\)

Elderly patients are the largest consumers of medication and nearly about 7.7% of the Indian population are geriatrics.\(^10\) Polypharmacy and major polypharmacy can be defined as prescription that has greater than or equal to five medications and greater than or equal to ten medications respectively.\(^11\) Polypharmacy in geriatrics is becoming a big problem because it is associated with a greater risk of ADEs, drug-drug interactions and medication non-compliance.\(^12\) Due to these emerging issues, there is a great need to assess the therapy designed for the geriatric population. Keeping this need in mind, we aimed to analyse the prescription pattern among the geriatric population using the Beers criteria and the START/STOOP criteria to assess the frequency of polypharmacy in geriatric patients.

2. METHODS

The study was conducted in a multiple disciplinary tertiary care hospital. This was a prospective observational study conducted over a period of six months from September 2019 to February 2020. Ethical approval was obtained from the Institutional Ethics Committee (IEC) prior to the commencement of the study. A total of 385 geriatric patients were randomly enrolled in the study based on inclusion criteria. A data collection form consisting of a separate section of patient demographic details and drugs treatment chart was prepared based on our study objectives. The data was collected after obtaining a written patient consent in the designed consent form. All the collected data was rechecked for minimizing the possible errors. All the collected data was entered into excel and then transferred to SPSS version 20 for further analysis. Analysis was done by comparing the medication received by the subjects with the AGS 2015 updated Beers criteria and STOPP/START criteria. Beers criteria is a set of clear criteria which gives a detailed note on potentially inappropriate drug that is used among the elderly population aged 65 years and above. This criterion is not applicable for a palliative care setting.\(^13,14\) STOPP/START criteria gives information regarding medications to be avoided and the medicine for right treatment in certain conditions. STOPP has 65 and START has 23 criteria which are considered and proposed under different physiological systems.\(^15\) Subsequently, assessment on the polypharmacy was also carried out. At last, the Beers and the STOPP/START criteria were compared with one another. The generic name and other detailed information of the prescribed drugs were analysed by referring up-to-date and Micromedex. Descriptive statistical analysis was carried out using SPSS Version 20.0.

3. RESULTS

3.1. Gender and Age-Wise Distribution of Inappropriateness in Prescription

A total of 385 patients were enrolled during the study duration. Among them \(n = 222\) (57.7%) were males and \(n = 163\) (42.35%) were females. The majority \(n = 282\) (73.2%) of our study subjects were between the age group of 65-74 years which was followed by the age group of 75-84, \(n = 89\) (23.1%) and the mean age of the study subjects were found to be 72.29 years±6.58 standard deviation. While analysing the prescription using Beers criteria and STOPP criteria, it was found that most of the inappropriateness in prescriptions were in males but the START criteria showed most of the inappropriateness to lie among female patients. The frequency of polypharmacy was higher among males than females as depicted in

Problems among the elderly can be due to the age-related physiological changes. In our study, we have enrolled 385 patients wherein, males were predominant over female patients. This pattern may be due to the higher number of male patients getting admitted in the hospital. Most of the patients belonged to the age category of 65-75 years with mean age of 72.29±6.58 years which could be attributed to the preference of home care by patients above 75 as they find it difficult to adjust to the perils of travelling long distances and the discomfort of

Table 1. Gender and age-wise distribution of inappropriateness in prescription

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Patients, n (%)</th>
<th>Beers criteria, n (%)</th>
<th>STOPP criteria, n (%)</th>
<th>START criteria, n (%)</th>
<th>&lt;5 drugs, n (%)</th>
<th>Polypharmacy</th>
<th>Minor, n (%)</th>
<th>Major, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>163 (42.3%)</td>
<td>14 (3.63%)</td>
<td>28 (7.3%)</td>
<td>9 (2.3%)</td>
<td>2 (0.25%)</td>
<td>72 (18.7%)</td>
<td>49 (12.7%)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>222 (57.7%)</td>
<td>38 (9.9%)</td>
<td>45 (11.7%)</td>
<td>7 (1.8%)</td>
<td>4 (1%)</td>
<td>81 (21%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Age-wise distribution of inappropriateness in prescription

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Total Patients, n (%)</th>
<th>Beers criteria, n (%)</th>
<th>STOPP criteria, n (%)</th>
<th>START criteria, n (%)</th>
<th>&lt;5 drugs, n (%)</th>
<th>Polypharmacy</th>
<th>Minor, n (%)</th>
<th>Major, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-74</td>
<td>282 (73.2%)</td>
<td>42 (10.9%)</td>
<td>57 (14.8%)</td>
<td>12 (3.1%)</td>
<td>53 (13.8%)</td>
<td>129 (33.5%)</td>
<td>100 (26%)</td>
<td></td>
</tr>
<tr>
<td>75-85</td>
<td>89 (23.1%)</td>
<td>9 (2.3%)</td>
<td>15 (3.9%)</td>
<td>4 (1%)</td>
<td>26 (6.8%)</td>
<td>39 (10.1%)</td>
<td>24 (6.2%)</td>
<td></td>
</tr>
<tr>
<td>85 and above</td>
<td>14 (3.6%)</td>
<td>1 (0.25%)</td>
<td>1 (0.25%)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>8 (2.1%)</td>
<td>6 (1.6%)</td>
<td></td>
</tr>
</tbody>
</table>

3.3. Analysis of Prescriptions Using STOPP/START Criteria

Among a total of 385 subjects, STOPP criteria show inappropriateness in n = 73 (19%) prescriptions. Analysis of prescription based on START criteria showed that n = 16 (4.2%) prescriptions were not following the START criteria.

3.4. Comparison of Polypharmacy and Screening Tools

Polypharmacy was categorized and analysed based on the three screening tools. Highest numbers of major polypharmacy was identified by STOPP criteria, 46(12%), followed by Beers criteria, 38 (10%). The details are tabulated and displayed in Table 4.

4. DISCUSSION

As age increases, there is a high chance for multiple chronic diseases as well as other comorbidities, leading to the use of complex therapeutic regimens. The use of inappropriate medication in the elderly can lead to various problems including diminished functional status, drug related problems, ADR, ADEs as well as increased health care costs. The changes in pharmacokinetic and pharmacodynamic as well as the increase in the incidence of medication related problems among the elderly can be due to the age-related physiological changes.

In our study, we have enrolled 385 patients wherein, males were predominant over female patients. This pattern may be due to the higher number of male patients getting admitted in the hospital. Most of the patients belonged to the age category of 65-75 years with mean age of 72.29±6.58 years which could be attributed to the preference of home care by patients above 75 as they find it difficult to adjust to the perils of travelling long distances and the discomfort of...
hospital stay. The similar trend of males dominating females and being observed in the age category of 65-75 years was observed in the study conducted in Turkey by Khamis S et al., whereas the contradictory findings were reported by a study conducted by Al- Azayzih A et al., and Kose E et al., as they reported majority of their study participants to be females.

When inappropriateness was assessed using Beers criteria, it showed that most of them were males (9.9%). It might be due to the higher hospitalization of males in the age category of 65-75 years. When the number of medications was decreased, inappropriateness according to Beers criteria also simultaneously saw a decline. These results were similar to a cross sectional study conducted by Pradhan S et al., which showed that most of the potentially inappropriate medications were found among males (97 out of 153) and between age group 65-74 (98 out of 153). Inappropriateness in medication was identified more in prescriptions with major polypharmacy. These observations were supported by the findings obtained from a cross sectional study conducted in Lahore, Pakistan by Muhammad R S et al.

It was observed that the STOPP Criteria was able to identify more inappropriate prescriptions among males in age group of 65-74 years and the inappropriateness was more for prescriptions with polypharmacy. This might be due to the fact that an increase in the number of medication increases the likelihood for drug interactions, medication error and inappropriate use of medication. A study conducted by Martins V D S et al., supported the observation that most of the inappropriate prescriptions were found in males (48.0%) and in prescriptions with more than 5 drugs (polypharmacy) but in contradiction, the observation obtained for the age group was different from our study and showed that most of the inappropriateness was found in subjects above 80 years (48.9%) probably, due to difference in clinical and socio-demographic details.

The result of this study revealed that those who had a diagnosis of hypertension, diabetes mellitus, and IHD showed majority of the inappropriateness according to Beer’s criteria and STOPP/START criteria. This is because the hypertension, diabetes and IHD are the most common and chronic disease requiring multiple drugs. The study conducted by Oliveira MGet al., and Muhammad R.S et al., also reported similar findings of a higher incidence of inappropriateness of medications based on Beers and STOPP/START criteria.

The present study shows that polypharmacy was found more in males of age group between 65-74 years. Similarly, majority of patients having polypharmacy were diagnosed with hypertension which displays a very close similarity to the study by Prasanna LMN et al.

STOPP criteria showed that the cardiovascular system has the highest prevalence of inappropriateness followed by the respiratory system. This is because the cardiovascular system of STOPP criteria states that drugs including aspirin and digoxin are inappropriate for use in the elderly. Similarly, the respiratory criteria of the STOPP screening tool states that theophylline and corticosteroids are inappropriate for use in people aged above 65, although all these drugs are found to be commonly used in elderly patients. START criteria ranked the highest inappropriateness to be of drugs used to treat respiratory illnesses. These result were concordant to that of a study conducted by Goudanavar P et al., which stated that respiratory drugs ranked the highest when the START criteria was used for assessment. Majority of the prescription in our study exhibited major polypharmacy. Thus, reducing the polypharmacy can bring down the incidence of the inappropriate use of drugs. The clinical pharmacist can play effective role in promoting the rational use of drugs by implementing various methods for minimizing the medications errors.

5. CONCLUSION

The findings of our study concluded that, the inappropriateness of medication was directly proportional to the number of medications. It vividly states that polypharmacy can be one of the main reasons to bring forth inappropriateness in prescription. The timely estimation and rational use of drugs can bring down the incidence of polypharmacy and thus, reduce the inappropriate use of medicines in the geriatric population.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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REFERENCES


