

Original Research Article

Potentially inappropriate medication prescribing patterns in geriatric patients in a health facility in Addis Ababa, Ethiopia

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Sent for review: 24 March 2020

Revised accepted: 19 October 2020

Abstract

Purpose: To assess potentially inappropriate medication (PIMs) prescribing pattern in geriatric patients attending the outpatient department (OPD) of the General Hospital in Addis Ababa, Ethiopia.

Methods: The study was conducted retrospectively for geriatric patients sixty years of age and above, who visited an Outpatient Department of Tirunesh Beijing General Hospital. Data were gathered for a duration of one month from prescriptions/encounters at the Outpatient Pharmacy, and analysis was carried out using SPSS (Statistical Packages for Social Sciences) version 20, while and drug prescribing indicators, and potentially inappropriate medications were calculated based on WHO prescribed indicators and Beer's criteria.

Results: Of the 400 encounters assessed, 218 (55 %) were male and 182 (45 %) were female. Four hundred prescriptions contained 1,003 drugs. Out of the mean drug per prescription of 2.51, drugs prescribed by generic names were 91.62 %, those prescribed from NLEM (national list of essential medicine) were 91.53 %; prescriptions with an antibiotic injection were 27.75 % and 16.25% respectively, and more than 5 drugs were prescribed only for 10.8 % of geriatrics patients. Cardiovascular drugs constituted about a quarter of the prescribed medications with 271 (27.02 %); others were analgesics, anti-inflammatory, anti-infective, endocrine drugs, gastrointestinal drugs, and other drugs, accounting for 116 (11.6%), 112 (11.2%), 96 (9.6%), 94 (9.4%) and 187 (18.6%), respectively. Potentially inappropriate drugs occurred in 46.9 % of the cases.

Conclusion: Potentially inappropriate medication (PIMs) prescribing in geriatric is highest in percentage. Proper interventions are needed from all concerned bodies to avoid drug-related complications.

Keywords: Geriatric, Drug utilization, Potentially inappropriate medications, Beers criteria

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INTRODUCTION

Inappropriate medication use is the use of drugs that either should be completely avoided or should be avoided at excessive dosages. Or

as an alternative that must not be used for excessive duration of therapy [1]. Drug utilization study was defined in 1993 by the World Health Organization (WHO) as "the promotion, distribution, prescription and use of

medications in society; with special attention to the outcome of therapeutic, societal and financial significances. It deals with various medication use, prescriptions, patterns of use, quality of use, factors of use, and outcomes, the aim is to endorse rational and appropriate use of medicines at the lowest possible dose and value [2-4].

The age of sixty-five years for people is accepted as elderly in most developed countries. This is also the case in Africa. The age at which one begins to accept pension benefits is taken as elderly, as there is no reference value by the World Health organization. However, the UN set limit of 60+ years refers to the elderly [5]. The world population aged sixty years and above numbered 962 million, and over two-thirds of the world's elderly persons live within the developing regions as at 2017. Between 2017 and 2050, the number of persons aged sixty years or above is expected to double to 1.7 billion within these regions [6]. Aging alters the physiology of each main organ system, and it has a direct effect on the alteration of body structure, energy, and protein metabolism, leading to age-related diseases. These alterations vary from patient to patient, and it is challenging for drug prescriptions. Also, the elderly are often under-represented at clinical trials, because of therapeutic complications and heterogeneity, creating a difficulty in giving appropriate care to their particular needs [7-10].

Inappropriate prescriptions are often associated with increased adverse drug effects, emergency (ER) room visits, and hospitalizations [11,12]. Potentially Inappropriate Medication (PIMs) among geriatric patients leads to hospitalization and unnecessary cost expenses. To avoid these draw backs, in 1991, the American Society of Geriatrics (AGS) developed a tool called, The AGS Beers Criterion, and it is updated periodically. It helps in improving medication safety, in making of clinical decisions, regulations, as well as safety improvement and quality of care [13].

METHODS

Study design and period

The study was carried out retrospectively using encounters with geriatric patients from the age of sixty years and above who were attending the Outpatients Department of Tirunesh Beijing General Hospital in Addis Ababa Ethiopia, for a period of one month, from July 20 to August 20, 2019.

Study area

The study was carried out in Addis Ababa, the capital of Ethiopia, in one of general hospitals called Tirunesh Beijing General Hospital, which is built by the collaboration of the Ethiopian and Chinese governments under the Addis Ababa City Administration. The hospital was founded in the Akaki Kality Sub-City and started service on March 5, 2012. The hospital offers its services to the surrounding Oromia Region inhabitants, and other nearby Sub-City residents (Nifas Silk Lafto and Bole) beyond the Akaki Kality Sub-City. Tirunesh Beijing Hospital Pharmacy follows the Ethiopian Hospital Reform Implementation Guideline (EHRIG) 2010, which guides hospitals in the implementation of critical operational standards. In addition, it aids hospitals in the delivery of quality services, and evaluates their performance using predefined indicators [14].

Study subject

Geriatric patient encounters/prescriptions were included in our study, with age group of 60 years of either sex who visited the Outpatient Department (OPD) from July 2017 to June 2018. The prescription papers were systematically selected from the Outpatient Pharmacy and retained at the dispensary of the facility, and each prescription was assessed according to WHO core prescribing indicators, as well as AGS Beers Criteria for potentially inappropriate drugs.

Data collection and analysis

The data was collected by WHO prescriber indicator forms and directly from the prescriptions, and medical records which contain the patients' details (age, gender, number of medicines per prescription, and costs of prescribed drugs) were collected and entered in designated data entry forms. All collected data was first cleaned up manually, and then entered into the SPSS version 20. The collected data was analyzed to get the average number of medicines per prescription, percentage of medicine prescribed by generic name, percentage of encounters with an antibiotic, percentage of encounters with injections, and the percentage of medicines prescribed from the essential drugs list. The percentage of Potentially Inappropriate Medications was calculated using Beer's updated criteria, and the results were expressed as actual numbers, frequency, and percentages, and then presented using tables and figures. The extent of Potentially Inappropriate Medications was evaluated by using Beer's updated criteria used for geriatric patients [15].

Procedures followed for calculating prescribing indicators

The mean number of drugs per prescription was calculated by dividing the total number of drugs prescribed by the number of prescriptions surveyed.

Percentage of drugs prescribed by generic name was calculated by dividing the number of medicines prescribed by generic name by the total number of medicines, then multiplied by 100.

Percentage of prescriptions with an injection and antibiotic encounters was determined by dividing the number of geriatric patient prescriptions during which an injection or an antibiotic was prescribed by the total number of prescriptions surveyed, which was then multiplied by 100, respectively.

Percentage of drugs prescribed from the essential drug list was calculated by dividing the number of products prescribed from the essential drug list of the hospital by the total number of drugs prescribed, and then multiplied by 100.

Ethical consideration

Ethical approval to conduct the study was obtained from Research Ethical Committee of Addis Ababa City Administration Health Bureau IRB with (ethics clearance No. 35748/228). The study was conducted according to the international ethical guidelines for health-related research involving humans [16].

RESULTS

A total of 400 prescriptions of geriatric patients who attended the Outpatient department were analyzed and evaluated.

Socio-epidemiological data

Among the 400 patients, 218(55 %) were male and 182 (45 %) were female. According to the collected data, the age composition of the study

population revealed that 114 (28.5 %) patients were in the age group of 60 – 64 years , 125 (31.2 %) were aged 65 - 69 years, 64 (16 %) were aged 70 - 74 year, 47 (11.8 %) were aged 75 - 79 years, 30 (7.5 %) were aged 80 - 84 years, 16 (4 %) were aged 85 – 89 years and 4 (1 %) were aged ≥ 90 years {Table 1}.

Table 1: Socio demographic profile of study population (N=400)

Age (years)	Frequency	Percentage
60-64	114	28.5
65-69	125	31.2
70-74	64	16.0
75-79	47	11.8
80-84	30	7.5
85-89	16	4.0
≥90	4	1.0

Analysis based on WHO core prescribing indicators

A total of 1003 drugs were prescribed to the study population, with an average of 2.51 drugs per prescription. 91.62% drugs were prescribed by their generic name. The percentage of prescribed drugs from NLEM (National List of Essential Medicine) was found to be 91.53 %, prescriptions with antibiotics was 27.75%, and encounters with injections was 16.25 % (Table 2).

Evaluation of polypharmacy

A total of 1003 drugs with an average of 2.51 drugs per prescription was prescribed for the study population. More than 5 drugs were prescribed to 10.8% of the prescriptions (5 drugs were prescribed to 6.3 %, 6 drugs were prescribed to 3.5% and 7 drugs were prescribed for only 1%). The minimum number of drugs prescribed was one, and the maximum number of drugs prescribed per prescription was 7, 1 drug - 28 %, 2 drugs-29.8 %, three drugs - 22 %, and four drugs - 9.5%. Polypharmacy in this study was only observed in 10.8 % of the geriatric population (Figure 1).

Table 2: Analysis of prescribing indicators of study population by WHO core indicators

Prescribing indicator	Results	WHO references value
Total no. of prescriptions analyzed	400	
Total no. of drugs prescribed	1003	2.51
Average no. of drugs per prescription	2.5075	1.6-1.8
Percentage of drugs prescribed by generic name	91.62%	100%
Percentage of injection	16.25%	13.4 –24.0 %
Percentage of prescriptions with an antibiotic	27.75%	20 – 26%
Percentage of drugs from EDL	91.53%	100%

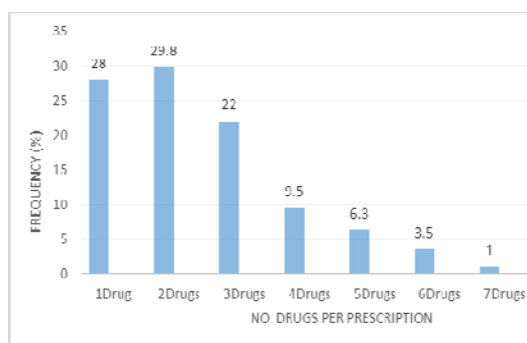


Figure 1: Percent of drugs prescribed per prescription

Distribution of prescribed drugs according to their therapeutic class

Among the prescribed drugs, cardiovascular drugs 271 (27.02 %) was the most frequently prescribed among the study population, followed by others 187 (18.6 %), analgesics and anti-inflammatory 116 (11.6 %), anti-infection 112 (11.2 %), endocrine drugs 96 (9.6 %), gastrointestinal drugs 94 (9.4 %) and so on, as shown on the (Table 3).

Table 3: Distribution of prescribed drugs according to their therapeutic class

Therapeutic class	Number (N=1003)	Percent
Cardiovascular drugs	271	27.02
Analgesics and anti-inflammatory	116	11.6
Anti-infective	112	11.2
Endocrine drugs	96	9.6
Gastrointestinal drugs	94	9.4
Blood modifying Agent	46	4.6
Musculoskeletal drugs	29	2.9
Vitamins	28	2.8
Respiratory drugs	21	2.1
CNS drugs	3	0.3
Others	187	18.6

*Percentage calculated from the total prescribed drugs

Potentially inappropriate medications prescribed based on updated Beers criterion 2019 lists

Potentially inappropriate medication occurred in 46.9 % of the cases, which means that among the prescribed drugs total of 1003 drugs, a total of 470 drugs were potentially inappropriate drugs prescribed for elderly patients. The encounters contained one or more medications from Beers list, Among PIMs, central alpha blockers and analgesics accounted for nearly a quarter (113 at 24.04 %) of the total drugs that were potentially inappropriate for elderly adults (Table 4).

Table 4: Potentially inappropriate medications prescribed based on updated Beers 2019 lists

Therapeutic class /medication	N	Percent
Central nervous system	27	5.7
Anticholinergic	5	1.06
Antiparkinsonian agents	2	0.45
Antispasmodics	6	1.28
Central alpha blockers	113	24.04
Endocrine	39	8.3
Gastrointestinal GI antispasmodics	49	10.4
Analgesics/ pain medication	113	24.04
Narcotic-like pain reliever.	20	4.26
Diuretic	89	18.94
Corticosteroids	7	1.5
Total	470	9.97

DISCUSSION

Due to aging, geriatric people are more susceptible to different diseases with several comorbidities. To treat the various diseases, different drugs are used, and this therapy leads to Polypharmacy. It is estimated that the occurrence of Polypharmacy is higher among geriatric people compared to other age groups. In this study, male (55 %) predominance was observed in comparison to females which is (45 %). The majority of patients were in the 65 - 69 years age group, which is 31.2 % of the study population, and which is different from a similar study conducted by Singh. The male population was 61.28 %, and the patients were in the 71 – 75 years age group [17]. These findings suggest that the prevalence of disease among males is higher than females.

In our study, the average number of medications per encounters was 2.51. In a similar study [18,19], the average number of drugs per patient was 9.37 and 7.37±2.22 (range 2-14) respectively [18,19]. Prescription by generic name in our study was 91.62 %.

In another study conducted by Singh [18], only 9.68 % drugs were prescribed by generic name [17]. There is a need to encourage the prescribers to prescribe drugs by generic name, especially for geriatric patients. This is because the cost of generic drugs is lower than that of branded drugs, and the former are more affordable by geriatric patients. In one study [19], the result showed the lowest percentage of the drugs were prescribed by generic names at 4.95 %. That is completely lower than our study, and this will expose the geriatric patient to costly drugs

In this study, the percentage of drugs prescribed from NLEM was 91.53 %. The study conducted in a tertiary care hospital was 48.79 %, which was

lower than our findings of drugs prescribed from the National Essential Drugs list [20].

Our study revealed that prescriptions with antibiotics was 27.75 %, and encounters with injection was 16.25 %. In the study by Borah et al. 2017, the results reported showed the large percentage of drugs prescribed with antibiotics at 61 %, and percentage of injection prescribed was 65 % [21]. The highest percentage prescription with an antibiotic and injection was reported by Bhavshaikh *et al* [19], which were 82.16 % and 85.89 % respectively, that is higher than our findings [19]. This finding will expose the geriatric patient to antibiotic resistance and unnecessary injection complications.

In our study among the prescribed drugs, cardiovascular drugs at 271 (27.02 %) was most frequently prescribed among the study population, followed by others at 187(18.6 %), Analgesics and anti-inflammatory at 116(11.6 %), anti-infection at 112(11.2 %), endocrine drugs at 96 (9.6 %), gastrointestinal drugs at 94 (9.4 %) and other study conducted by Singh, the most drug prescribed for geriatric patients were cardiovascular drugs (22.27 %), gastro intestinal drugs (15.3 %) and antibiotics (13.28 %) [17].

In our study, more than 5 drugs were prescribed in 10.8 % of the prescriptions (5 drugs were prescribed to 6.3 %, 6 drugs were prescribed to 3.5% and 7 drugs were prescribed for only 1 %). The minimum drug prescribed was one, and the maximum drugs prescribed was 7 per prescription. 1 drug 28 %, 2 drugs 29.8 %, three drugs 22 %, and four drugs 9.5 % were prescribed in the study done by Anusha Joel. The drugs prescribed were 1-3 drugs/prescriptions in 5 cases, 3-5 drugs per prescription in 29 cases, and prescriptions with more than 5 per prescription were in 166 cases. Poly pharmacy was found in 67.91 % of the cases. The figures reported were more than our findings got [22].

The prevalence of Potentially Inappropriate Medications (PIM) prescription in this study was high among geriatrics. 46.9 % of geriatric patients face this problem, and in a similar study done in India, the result revealed that 35.5 % of patients were prescribed potentially inappropriate medications [23]. Other retrospective studies done in India and Saudi Arabia showed large number of PIMs prescribed for geriatric patients. The result was 66 %, and 84.14 % respectively, received at least one PIMs according to the Beers Criteria [24,25], and the lowest percentage rate in Bangalore from which only 9.5 % PMIs were prescribed and which is lower than our findings [26]. In a similar study done in Nepal on Geriatric

patients, the study revealed that at least one instance of PIMs was experienced by approximately 26.3 % of patients, and it was lower than our study findings, and as the percentage of PIMs increases drug related complication, even hospital admission will occur among geriatric patients.

Limitation of the study

Our sample size was only from the government General Hospital within the capital city, and thus limited. Our findings therefore, could not generalize the position of the entire health sector in the country. Future studies with larger data will help to achieve generalizability on potentially inappropriate medications (PIMs) prescribing patterns.

CONCLUSION

Potentially inappropriate medication (PIMs) prescribing in geriatric is high (46.9 %). Proper interventions are required from all concerned bodies to avoid drug-related complications. Prescribers should update themselves on the use of guidelines. Beers criteria should be strictly followed before prescribing drugs for the vulnerable patients. Most of the core drug prescription indicator results are slightly deviated from the normal values developed by WHO, and the rate of polypharmacy is minimal in this study.

DECLARATIONS

Acknowledgement

We would like to thank Addis Ababa City Administration Health Bureau, and the staff of Trunesh Beijing General Hospital Outpatient Pharmacy for providing us the facilities to carry out this research work.

Conflict of interest

No conflict of interest associated with this work

Contribution of authors

We declare that this work was done by the authors named in this article, and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. All authors contributed equally to this work.

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