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Original Research Article

Analysis of inappropriate medication use and drug interaction in older people visiting tertiary care center of eastern Nepal

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ABSTRACT

Background: Medication use in older people has been increasing as the incidence of chronic diseases increases worldwide. Use of more medicines may increase the chance of prescribing potentially inappropriate medications (PIMs) and may increase the risk of potential drug-drug interactions (pDDIs). The objective of this study was to assess PIMs and pDDIs to improve the rational use of medications

Methods: In this study data from the older people were obtained from patient visiting medicine, OPD, BPKIHS, Dharan. Demographic and medications information were collected. PIM and pDDIs were evaluated from medication data using the Beer's criteria for potentially inappropriate medication use in older adults, 2015 and lexicomp application respectively.

Results: Among 550 patients 50.9% patients were male. Common diagnosis was systemic hypertension 335 (64.5%) followed by type 2 diabetes mellitus 276 (50.18%). The most commonly prescribed drug was metformin (215) followed by amlodipine (205), atorvastatin (176), losartan (158), glimepiride (113) and aspirin (100). One or more fixed drug combination was present in 295 prescriptions. One or more PIM were present in 29 (5.3%) prescriptions. Commonly prescribed PIM was prazosin (11) followed by nitrofurantoin (5). There were total of 753 cases of pDDIs, with 116 (15.40%) cases of risk categories X and D.

Conclusions: Our findings demonstrated PIM use were relatively less. However, pDDIs were common in older people suggesting that optimal medication use and further similar studies in larger scale are necessary in this population.

Keywords: PIM, pDDI, Older people

INTRODUCTION

Incidence of chronic diseases in elderly people has increased worldwide.¹ This means that older people are prescribed with more medicines. Due to this obvious reason poly pharmacy is common among elderly patients. Further we know that older people generally have physiological characteristics different from general adults, affecting pharmacodynamics and pharmacokinetics of certain medications. So due to poly pharmacy and altered physiological conditions they are more prone to medicine related problems.^{2,3} As a result there are concerns relating to PIM and pDDIs in this population.

Beer's criteria are used to identify medication that requires precautions for use in elderly people. The latest version of beer's criteria in 2015 expanded the scope and number of PIMs through evidence-based evaluation of the literature. Further pDDI can be analyzed by using lexicomp website.⁴ Beer's criteria are basically the guidelines for healthcare professionals to help improve the safety of prescribing medications for older adults. They emphasize deprescribing medications that are unnecessary, which helps to reduce problems of polypharmacy, drug interactions, and adverse drug reactions, thereby improving the risk-benefit ratio of medication regimens in at-risk people.⁵

Lexicomp apps is the apps under Wolters-Klumer, global company that provides information, software, and services to professionals in healthcare.⁴

Analyses of PIMs and pDDIs may help to assess and improve drug related problems (DRPs) in older people. Therefore, this cross-sectional study in older people was planned to evaluate PIMs and pDDIs with the aim of improving the appropriateness and safe use of medications in these population.

Aim

Aim of the study was to analyse the in appropriate medication use and drug interaction in elderly patients.

General objectives

The general objectives of the study were to analyse in appropriate medication use and drug interaction in elderly patients.

Specific objectives

The specific objectives were to analyse the PIM, to analyse the pDDIs and to find the prescription pattern in elderly patients.

METHODS

The study considered 95% CI and 80% power to estimate the sample size. For this purpose, study considered 16.8% prevalence of PIMs among elderly population.⁴

Now using following formula: $n = z^2pq/d^2$

Where, $z=1.96 \approx 2$ at 95% CI, therefore, $z^2=4$, $p=16.8$, therefore, $q=100-16.8=83.2$, $d=20\%$ of P at 80% power, therefore, $d=3.36$, now, $d^2=11.3$.

Putting all the values in the formula, the sample size= $4 \times 16.8 \times 83.2 / 11.3 = 5591.04 / 11.3 = 495$

Now adding 10% in calculated sample size to reduce the various biases, sample size becomes approximately 550.

Inclusion criteria

Patients aged 60 years and above visiting medicine OPD of BPKIHS were included in study.

Exclusion criteria

Patients aged less than 60 years of age were excluded from the study.

Data collection technique/ specific methodology

In this cross-sectional study patients greater than 60 years visiting medicine OPD, B. P. Koirala institute of health

sciences (BPKIHS) Dharan, Nepal taking more than one medication were included. The study duration was 1.5 year from January 2019 to June 2020. Demographic information was collected using standard questionnaire during face-to-face interview and will include the information on age, sex, income, education, alcohol consumption, smoking, exercise, marital status, medical history, medication history and concurrent medications. Patients was asked to bring their medications or prescription for accurate identification of name and strength of each medication. Beer’s criteria were used to identify PIMs. Patients with PIM prescription was further evaluated to determine the generic name and anatomical therapeutic chemical (ATC) classification of each medication. Analysis of pDDIs was conducted using the Lexi-comp application. The severity of pDDIs was categorized into five levels: A, B, C, D and X. The frequencies of PIM and pDDIs was calculated and presented by listing the most common medications. The data was recorded in Microsoft excel 2010 worksheet. Descriptive statistics was used to summarize several demographic parameters, pDDI and PIM. All statistical analyses were carried out using SPSS software version 10.0, IBM corporation. The ethical approval was taken prior to study from institutional review committee (IRC), BPKIHS, Dharan, Nepal.

RESULTS

Male patients were 50.9%. Common age group amongst patients were of 60-69 years (68.9%). Most of the patients were non alcoholics (56.9%) and non-smokers (70.5%). Majority of the patients were not involved in physical exercise (74.9%). Common indications for medication use were hypertension followed by type 2 diabetes mellitus, cardiac diseases and hypothyroidism. Number of drugs (mean) per prescription was 4.52 (Range-2-11) (Table 1).

Commonly prescribed drugs were metformin, amlodipine, atorvastatin, losartan, glimepiride and aspirin (Figure 1).

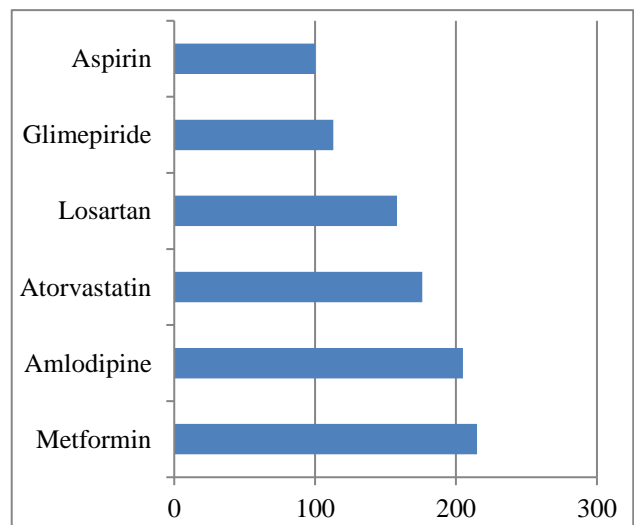


Figure 1: Commonly prescribed drugs.

Table 1: Baseline characteristics.

Characteristics	Number (%)
Age (Years)	
60-69	379 (68.9)
70-79	141 (25.6)
≥80	30 (5.5)
Sex	
Male	280 (50.9)
Female	270 (49.1)
Alcohol consumption	
Non drinker	313 (56.9)
Past drinker	159 (28.9)
Current drinker	78 (14.2)
Smoking	
Non smoker	388 (70.5)
Past smoker	126 (22.9)
Current smoker	36 (6.5)
Exercise	
No	412 (74.9)
Yes	138 (25.1)
Marital status	
Divorced	2 (0.4)
Widow(er)	75 (13.6)
Married	473 (86)
Common indications	
Systemic hypertension	355
Type 2 diabetes mellitus	276
Cardiac disease	90
Hypothyroidism	68
Kidney disease	55
Dyslipidemia	45
Number of medications per patient mean (range)	4.52 (2-11)

Total of 753 pDDI were detected with most them being of risk category C (Table 2).

Table 2: pDDI in older people.

Risk category	Number of pDDI (%)
Risk X: Avoid combination	5
Risk D: Consider therapy modification	110
Risk C: Monitor therapy	617
Risk B: No action needed	13
Risk A: No known interaction	8
Total	753

Drugs involved in category X were tiotropium and levocetazine, levosuloride and hyoscine, tiotropium and fexofenadine, as well as the ramipril and telmisartan (Table 3).

One or more PIM were present in 29 (5.3%) prescriptions. Commonly prescribed PIM were prazosin followed by nitrofurantoin and amitriptyline (Table 4).

Table 3: Commonly prescribed pDDI (Risk X) in older people.

Medication 1	Medication 2	Number of pDDI (%)
Tiotropium	Fexofenadine	1 (20)
Levosulpride	Hyoscine	1 (20)
Tiotropium	Levocetazine	2 (40)
Ramipril	Telmisartan	1 (20)

Table 4: Commonly prescribed PIMs.

Medication	Number of PIMs
Prazosin	12
Nitrofurantoin	5
Amitriptyline	3
Clonazepam	2
Clonidine	2
Amiodarone	1
Digoxin	1
Chlorzoxazone	1
Indomethacin	1
Diclofenac	1
Naproxen	1
Total	30

DISCUSSION

the average number of drugs per patient was 4.54 which was comparable with a study done in India.¹⁵

Commonly prescribed drugs in elderly patients were metformin, amlodipine, atorvastatin, losartan, glimepiride and aspirin. These are somewhat similar to that with study conducted in India in older patients.¹⁵

The current study showed frequency of PIM to be 5.3%. One study done in Nigeria shows that 30.3% of elderly patients received at least one potentially inappropriate medication.⁶ Other study done in Japan revealed 21.1% of patients being treated with potentially inappropriate medication independent of disease or condition.⁷ A study done in India shows 25.9% of the patients received at least one inappropriate medication.⁸ Further a study conducted in South Korea on 864 elderly patients showed the incidence of PIM to be 16.8%.⁴ A systematic review which included 17 studies has shown the prevalence of PIM to be ranging between 18.5% and 46.5% using Beer's criteria.⁹ The relative lower frequency of PIM in our study as compared to other studies may be due to the smaller sample size of our study.

In this study the pDDI were seen in 58.2% of the patients. Results were consistent with a study conducted in Brazil showing the frequency of pDDIs to be 49.7%.¹⁰ Further studies done in Turkey, where 5059 prescriptions were analyzed, 33% were found to have a potential drug-drug interaction.¹¹ In this case the incidence of pDDIs is relatively lower than in other studies owing to the higher

sample size. A study done on Ethiopia where prescription of 332 patients were analyzed, the frequency on pDDIs was 72.6%.¹² Another study done in India revealed pDDIs to be 16%.¹³ A similar study done in western part of Nepal revealed the incidence of pDDIs to be 21.3%.¹⁴ From this discussion we can say that in our study the frequency of pDDI was similar to the other studies which analyzed similar number of prescriptions.

Limitations

This study enrolled the patients visiting, OPD internal medicine only. It could be better if patients visiting various other OPDs were included.

CONCLUSION

Our findings demonstrated PIM use were relatively less. However, pDDIs were common in older people suggesting that optimal medication use and further similar studies in larger scale are necessary in this population.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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