Original Article

Potentially Inappropriate Medications Identified Using Beers Criteria Prescribed to Geriatric Patients in an Outpatient Department of a Tertiary Care Hospital in Bangladesh

Khan SJ[1], Sultana A[2], Tanira S[3], Asaduzzaman M[4], Nahar K[5], Fatema SK[6], Sultana S[7]

ABSTRACT

Ageing associated with multiple comorbidities tends to expose elderly population to the risk of potentially inappropriate medications (PIMs), which may turn into an important contributing factor for negative health impacts, e.g., adverse drug reactions, hospitalization, increased morbidity and mortality. A cross-sectional, observational study was conducted to assess the prevalence of potentially inappropriate medications (PIMs) as prescribed to geriatric patients in an out-patient department (OPD) of Dhaka Medical College Hospital, which is a tertiary level teaching hospital in Dhaka, Bangladesh. The study was carried out between January and December of 2021. A total of 114 elderly patients (e" 60 years) were enrolled in this study. Data was collected by face-to-face interview and from patients' prescriptions using a pre-tested semi-structured data collection sheet. Data were reviewed according to American Geriatrics Society endorsed 2019 Updated AGS Beers Criteria and analyzed using SPSS version 22.0. Most of the respondents belonged to 60-69 years age group (69.3%) and the mean age was 68.25±7.2 years. 59.6% of the patients were male and 40.4% were female. A total of 31(27.19%) elderly patients were found having potentially inappropriate medications (PIMs), as prescribed from the outdoor service. The highest number of PIMs was found in the e"80 years age group (44.44%), followed by 60-69 years (26.58%) and 70-79 years (23.08%) age groups (p=0.057). 28.3% of female patients got PIMs, while 26.5% of males were prescribed PIMs (p=0.833). In our study, the most common PIMs identified was pain medication (NSAIDs) (51.62%), followed by benzodiazepines (22.58%), antidepressants (12.9%), proton-pump inhibitors (6.45%), and first-generation antihistamines (6.45%).

Keywords: *Ageing, geriatric patient, prescribed medication, potentially inappropriate medications, Beers criteria*

Mugda Med Coll J. 2024; 7(2): 72-76
https://doi.org/10.3329/mumcj.v7i2.78710

INTRODUCTION

A rapid increase in the older population is a common global phenomenon, especially in developed countries like Bangladesh[1]. In Bangladesh, as of 2019, over 13 million people are aged over 60 which was 8% of the country's total population. The proportion of older people is expected to double to 21.9% in 2050 with 36 million people aged over 60[2]. It means for every five Bangladeshi people, one will be a senior citizen[2].

1. Dr. Sharmin Jahan Khan, Lecturer, Department of Pharmacology & Therapeutics, Mugda Medical College, Dhaka-1214.
2. Dr. Afroza Sultana, Associate Professor, Department of Pharmacology & Therapeutics, Mugda Medical College, Dhaka-1214.
3. Dr. Shaorin Tanira, Geriatric Care Consultant, Phoenix Wellness Centre, Dhaka-1206.
4. Dr. Muhammad Asaduzzaman, Assistant Professor, Department of Orthopaedics, National Institute of Traumatology & Orthopaedic Rehabilitation (NITOR), Dhaka-1207.
5. Dr. Kamrun Nahar, Lecturer, Department of Pharmacology & Therapeutics, Mugda Medical College, Dhaka-1214.
6. Dr. Syeda Kaniz Fatema, Lecturer, Department of Pharmacology & Therapeutics, Mugda Medical College, Dhaka-1214.
7. Dr. Sadia Sultana, Lecturer, Department of Pharmacology & Therapeutics, Mugda Medial College, Dhaka-1214.

Address of Correspondence: Dr. Sharmin Jahan Khan, Lecturer, Department of Pharmacology & Therapeutics, Mugda Medical College, Dhaka-1214. Email: sharmin.reepa@gmail.com

Therefore, healthcare service and related research involving elderly people is crucial for us.

We know that as people experience ageing process, weakness is inevitable, and elderly people become prone to multimorbidities, especially chronic diseases. With the increase in chronic diseases whether alone or combined, elderly patients often have to use multiple medications at the sametime[3]. Polypharmacy (taking several medications each day, often defined as five or more) is associated with an increased incidence of adverse drug events, decreased functional status, and increased healthcare costs[4]. Moreover, ageing associated anatomic and physiologic changes, the pharmacokinetics and pharmacodynamics profile of drugs in the body are also affected. Thus, the elderly people often require adjustment of drug selection and dosing[5].

Potentially inappropriate medications (PIMs) can be defined as drugs for which use among elderly patients should be avoided due to the high risk of adverse reactions among them and or insufficient evidence of their benefits when safer and equally or more effective therapeutic alternatives are available.[6,7] PIMs are associated negative outcomes, including ADRs, morbidity, hospitalization, health services use, and increased costs[6]. Evidence showed high prevalence of potentially inappropriate medications (PIMs) in both developed and developing countries[8]. Within Asian countries, the prevalence of PIMs was found 21.1% and 32.7%, in Japan and Malaysia respectively[9]. In Beijing, China it has been documented the prevalence of PIMs 53.5% and 44.7% in elderly patients identified using the Beers Criteria in 2015 and 2012[10]. A from Dhaka, Bangladesh, showed that 11.96% of total drugs prescribed were potentially inappropriate and 27.26% of elderly patients received at least one potentially inappropriate medication[11]. Hence, potential inappropriate medications (PIMs) in prescriptions are a major health problem affecting elderly persons in any society.

There are various screening tools are available for the assessment of appropriateness of prescriptions of elderly patients; among them, the American Geriatrics Society's Beers Criteria[12] is one of the most commonly used tools for healthcare professionals and researchers to identify PIMs in older patients. The American Geriatrics Society AGS Beers Criteria were developed in 1991 to decrease potentially inappropriate medication use and the hospitalization rate.[6] These criteria were recently updated in 2019[12].

Although the evaluation of appropriateness of prescribing in geriatric patients is mandatory, there is paucity of evidence and guidelines on which such patients could be prescribed and lack of repots on the use of potentially inappropriate medicines (PIMs) in elderly population of Bangladesh. Moreover, to our knowledge, no study has been done in our country that identified PIMs in elderly patients using the 2019 updated version of AGS Beers Criteria. Therefore, this study was undertaken at a tertiary level teaching hospital with an aim to observe the prevalence of PIMs in prescriptions given to the geriatric patients (≥60 years) using the American Geriatrics Society 2019 Updated AGS Beers Criteria.

METHODS

This cross-sectional, observational study was conducted among 114 elderly patients visited medicine out-patient department (MOPD) of Dhaka Medical College Hospital, a tertiary level teaching hospital, in Dhaka, Bangladesh. The study was carried out between January and December of 2021. Consecutive sampling was done to include elderly patients (≥60 years). Data was collected through a face-to-face interview and using prescriptions given to them from MOPD by using a pre-tested semi-structured questionnaire form/sheet. Information of socio-demographic variables, e.g., age and sex, were noted down, and PIMs were identified using American Geriatrics Society 2019 Updated AGS Beers Criteria[12] from prescriptions. All the data were compiled, sorted properly, and analyzed. Data were then presented through tables expressed in frequency and percentage or mean±SD, as appropriate. Chi-square tests were performed to compare between the groups. A p-value <0.05 was considered as statistically significant. Statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS) software version 22.0 for windows (SPSS Inc, Chicago, Illinois, USA).

Ethical clearance was obtained from the Ethical Review Committee of Dhaka Medical College, Dhaka, Bangladesh.

RESULTS

A total of 114 elderly patients visited medicine outpatient department were included in this study. The majority of the respondents belonged to 60-69 years age group (69.3%) and the mean age of geriatric patients was 68.25±7.2 years (Table-I). 83 (59.6%) were male and 31 (40.4%) were female. Among the

respondents, the highest prevalence of PIMs was found in the ≥80 years age group (44.44%), followed by 60-69 years age group (26.58%) and 70-79 years group (23.08%). However, the difference was not statistically significant (p=0.057). 28.3% of female patients got PIMs compared to 26.5% of its male counterpart; however, the difference was not statistically significant (p=0.833) (Table-II). Prevalence of prescribed PIMs in 60-69 years age group, male 61.9% and female 38.09%, while in both 70-79 years and ≥80 years age groups, male 50% and female 50% (p=0.821) (Table-III). The most common of PIMs identified was pain medication (NSAIDs) (51.62%), followed by benzodiazepines (22.58%), antidepressants, alone or in combination (12.9%), proton-pump inhibitors (6.45%), and first-generation antihistamines (6.45%) (Table-IV).

Table-I : *Demographic characteristics of the patients (n=114)*

Age group	Frequency	Percentage
60 to 69 years	79	69.3
70 to 79 years	26	22.8
≥80 years	9	7.9
Mean±SD	68.25±7.2 years	
Range	60-98 years	

Table II: *Demographic characteristics and use of PIMs in the prescriptions of the patients (n=114)*

Characteristics	Use of PIMs				p-value
	Yes		No		
	Frequency	Percentage	Frequency	Percentage	
Age group (years)					
60 to 69	21	26.58	58	73.52	
70 to 79	06	23.08	20	76.9	0.057[a]
≥80	04	44.44	05	55.56	
Gender					
Male	18	26.5	50	73.5	0.833[a]
Female	13	28.3	33	71.7	

[a] p-value was obtained from Chi-Square test

Table-III: *Distribution of PIMs in the prescriptions of the patients by age group (n=31)*

Age (years)	Gender				p-value
	Male		Female		
	Frequency	Percentage	Frequency	Percentage	
60 to 69	13	61.9	8	38.09	
70 to 79	3	50.0	3	50.0	0.821[a]
> 80	2	50.0	2	50.0	

[a] p-value was obtained from Chi-Square test

Table-IV: *Prescription drugs among PIMs based on 2019 updated Beers criteria (n = 31)*

Therapeutic class of PIMs	Name of medication	Frequency	Percentage
NSAIDs	Naproxen, diclofenac	16	51.62
Benzodiazepines	Clonazepam, diazepam	7	22.58
Antidepressants, alone or in combination	Amitriptyline, alone or in combination	4	12.9
Proton-pump inhibitors	Omeprazole, lansoprazole (>8 weeks)	2	6.45
First-generation antihistamines	Chlorpheniramine	2	6.45

DISCUSSION

In our study, the majority of the elderly patients belonged to the 60-69 years of age group and the mean age was 68.25±7.2 years. Almost similar findings were observed in Lebanon by Zeenny et al.[13], where most of the patients belonged to the 65-69 years age group and the mean age of geriatric patients was 70.9±5.0years. The majority (59.60%) of our patients were male. Similar finding was reported by Lemma et al.[14], as they included a total of 400 Ethiopian patients (of which 55% were male).

In the present study, 27.19% of geriatric patients had PIMs in their prescriptions. Some other studies reported similar prevalence of PIMs, i.e., 27.26% in Bangladesh[10], 32.7% in Malaysia[9] and 34% in Sothern India[15]. 28.3% of the female patients got PIMs, while 26.5%of the male patients had PIMs in their prescriptions, as revealed in our study. A similar observation was reported by Al-Azayzih et al.[16]; they showed that females received more PIMs due to having multiple chronic conditions than that of males in Jordan.

In the present study, the highest number of PIMs was found in the e•80 years age group (44.44%), followed by 60-69 years age group (26.58%) and 70-79 years group (23.08%). Zeenny et al.[13] found that 75% in the e•80 years age group received PIMs, 46.7% in the 75-79 years age group, 42.9% in the 70-74 years age group and 41.3% in the 65-69 years age group.

In our study, most commonly prescribed PIMs identified by using AGS Beers criteria were pain medications, i.e., NSAIDs (51.62%), followed by benzodiazepines (22.58%), antidepressants, alone or in combination (12.9%), proton-pump inhibitors (6.45%), and first-generation antihistamines (6.45%). Several other studies reported more or less same types of PIMs prescribed to the older patients[17-20].

Our study had some limitations. The sample size of the study was relatively small and collected from only one unit of OPD of a single hospital. Therefore, the sample may not represent the exact picture of Bangladeshi geriatric population. However, the findings may help to enhance the information pool for future studies.

CONCLUSION

Our study revealed that use of potentially inappropriate medications (PIMs) is very common in prescription given to the geriatric patients in Bangladesh. 27.19% of elderly patients were found having potentially inappropriate medications (PIMs), as prescribed from the outdoor service. The highest number of PIMs was found in the e•80 years age group, while male and female patients were equally prescribed with PIMs. The findings signify that prescribers are not perfectly aware about potentially inappropriate medications (PIMs) and their risk factors for elderly people due to lack of guidelines and proper training.

REFERENCES

1. World Health Organization (WHO). Ageing and health. Key Facts. 2023. Retrieved from: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health (Accessed January 19, 2023).
2. HelpAge International. Ageing population in Bangladesh. Retrieved from: https://ageingasia.org/ageing-population-bangladesh/ (Accessed January 19, 2023).
3. Tian F, Chen Z, Zeng Y, Feng Q, Chen X. Prevalence of use of potentially inappropriate medications among older adults worldwide: A systematic review and meta-analysis. JAMA Netw Open. 2023;6(8):e2326910.
4. Baruth JM, Gentry MT, Rummans TA, Miller DM, Burton MC. Polypharmacy in older adults: the role of the multidisciplinary team. Hosp Pract. 2020;48(Suppl):56-62.
5. Mangoni AA, Jackson SH. Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. Br J Clin Pharmacol. 2004;57(1):6-14.
6. Abdelwahed AA, El-Dahiyat F, Aljawamis D, Al Ajimi J, Bin Rafeea KJ. Potentially inappropriate medications in older adults according to Beers criteria 2019: Prevalence and risk factors. Int J Clin Pract. 2021;75(11):e14715.
7. O'Connor MN, Gallagher P, O'Mahony D. Inappropriate prescribing: criteria, detection and prevention. Drugs Aging. 2012;29(6):437-52.
8. Nothelle SK, Sharma R, Oakes A, Jackson M, Segal JB. Factors associated with potentially inappropriate medication use in community-dwelling older adults in the United States: a systematic review. Int J Pharm Pract. 2019;27(5):408-423.
9. Chen LL, Tangiisuran B, Shafie AA, Hassali MA. Evaluation of potentially inappropriate medications among older residents of Malaysian nursing homes. Int J Clin Pharm. 2012;34(4):596-603.

10. Zhang X, Zhou S, Pan K, Li X, Zhao X, Zhou Y, Cui Y, Liu X. Potentially inappropriate medications in hospitalized older patients: a cross-sectional study using the Beers 2015 criteria versus the 2012 criteria. Clin Interv Aging. 2017;12:1697-1703.

11. Roy US, Khan MR, Rahman MA, Ahmed T, Majumder NK. Potentially inappropriate medication use in elderly adults: A prospective study in cardiology outpatient department of a tertiary care teaching hospital. J Shaheed Suhrawardy Med Coll. 2019;11(2):101-5.

12. The 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 Updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults. J Am Geriatr Soc. 2019;67(4):674-94.

13. Zeenny R, Wakim S, Kuyumjian YM. Potentially inappropriate medications use in community-based aged patients: a cross-sectional study using 2012 Beers criteria. Clin Interv Aging. 2017;12:65-73.

14. Lemma W, Islam M, Loha E. Potentially inappropriate medication prescribing patterns in geriatric patients in a health facility in Addis Ababa, Ethiopia. Tropic J Pharma Res. 2020;19(11):2441-6.

15. Bhatt AN, Paul SS, Krishnamoorthy S, Baby BT, Mathew A, Nair BR. Potentially inappropriate medications prescribed for older persons: A study from two teaching hospitals in Southern India. J Family Community Med. 2019;26(3):187-92.

16. Al-Azayzih A, Alamoori R, Altawalbeh SM. Potentially inappropriate medications prescribing according to Beers criteria among elderly outpatients in Jordan: a cross sectional study. Pharm Pract (Granada). 2019;17(2):1439.

17. Leikola S, Dimitrow M, Lyles A, Pitkälä K, Airaksinen M. Potentially inappropriate medication use among Finnish non-institutionalized people aged e”65 years: a register-based, cross-sectional, national study. Drugs Aging. 2011;28(3):227-36.

18. Nam YS, Han JS, Kim JY, Bae WK, Lee K. Prescription of potentially inappropriate medication in Korean older adults based on 2012 Beers Criteria: a cross-sectional population based study. BMC Geriatr. 2016;16:118.

19. Patel MM, Mark AS, Patel VJ. Potentially inappropriate medications in Indian geriatric patients visiting out-patient departments of tertiary care teaching hospital. J Pharmacol Pharmacother. 2020;11(2):53-8.

20. Varavithya V, Tirapat C, Rojpibulstit P, Poovichayasumlit P, Prasert V, Vatcharavongvan P. Potentially inappropriate medication use and the hospitalization rate among Thai elderly patients: a retrospective cohort study. Eur J Clin Pharmacol. 2022;78(5):847-55.