

Original Research Article

Prevalence of polypharmacy and its associated factors: a cross-sectional study among elderly population

Nidhi P. Sastry^{1*}, Jyotsna S. Deshmukh²

¹Department of Community Medicine, LTMMC and LTMGH, Sion, Mumbai, Maharashtra, India

²Department of Community Medicine, Government Medical College, Nagpur, Maharashtra, India

Received: 11 June 2025

Revised: 09 July 2025

Accepted: 18 July 2025

*Correspondence:

Dr. Nidhi P. Sastry,

E-mail: nidhisastory2303@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Polypharmacy is the concurrent use of multiple medications, defined as the routine use of five or more medications. With such a dynamically growing elderly population, concerns regarding polypharmacy and its effect on this geriatric population need to be studied. Hence, this study aims to estimate the prevalence of polypharmacy among elderly and its associated factors and impact.

Methods: A cross-sectional study was conducted in the outpatient department (OPD) of an Urban Health Training Centre affiliated to a tertiary health care hospital in Maharashtra among 150 elderly patients above 60 years of age. Association between polypharmacy and study variables were assessed using Chi-square test.

Results: Mean age of participants was 69.23 ± 5.90 years. Prevalence of polypharmacy in our study was 76 (50.67%). It was observed that maximum patients 48 (32%) took 5 medicines and hypertension was the most common morbidity 68 (45.33%).

Conclusions: The associated factors with polypharmacy were found to be age, education, socioeconomic status, number of morbidities, number of doctors consulted, hospital admission in the last 3 months. The impact of polypharmacy on adverse drug reactions, out of pocket expenditures and adherence to medications were found to be significant.

Keywords: Elderly, Multimorbidity, Polypharmacy, Self-medication

INTRODUCTION

Multimorbidity is defined as the co-existence of two or more chronic health conditions.¹ Multimorbidity increases with age and is common among elderly. The number of medicines prescribed increases with increasing number of morbidities. Globally the prevalence of polypharmacy is set to rise as the population ages and more people suffer from multiple long-term conditions, making polypharmacy a major and growing public health issue occurring within all health care settings worldwide.² Polypharmacy is the concurrent use of multiple medications, defined as the routine use of five or more medications.²

Elderly or senior citizens have been defined in the National policy for older person 1999 as people with age more than 60 years.³ Prevalence of polypharmacy is increasing as aging individuals often have to deal with multiple chronic health problems.⁴ Some common conditions for which the medications are required are hypertension, diabetes, dyslipidemia, coronary heart diseases, insomnia, arthritis, chronic obstructive pulmonary disease (COPD), depression.⁵ Various factors affect polypharmacy in elderly people including age, gender, level of education, frequent visit to doctors, and types and number of diseases.⁶ Some causes of polypharmacy are patients self-medicating with over-the-counter medications without awareness of the adverse reactions and interactive effects from these medications, availability of newer medications and curiosity towards it, one patient consulting multiple

physicians and continuing with each prescription, without proper therapeutic reconciliation, availability of alternative treatments like Ayurveda, herbal medicines.⁷

A person over the age of 60 may have a different body composition than a person who is 35, and may process medications differently.⁵ One of the most important risks of polypharmacy in adults over age 60 is oversedation, which can cause confusion or drowsiness and raise the risk of household and car accidents.⁵

Polypharmacy leads to decreased quality of life, physical problems, increased drug interactions, side effects, and medical problems and also increases the cost of treatment.⁶ A study claimed that patients taking two drugs face a 13% risk of adverse drug interactions, rising to 38% when taking four drugs and to 82% if seven or more drugs are given simultaneously.⁸

As per a systematic review, the pooled prevalence of polypharmacy in India was 49%.⁹ According to 2021 census projections, there are 137.9 million elderly aged 60 or above and is expected to reach 193.4 million by 2031.^{10,11} With such a dynamically growing population of the elderly, concerns regarding polypharmacy and its effect on the geriatric population need to be studied.⁷ While a lot of research has been done on polypharmacy from the pharmacology aspect, the public health impact also needs to be assessed.

Hence, this study aims to estimate the prevalence of polypharmacy among elderly and its associated factors and impact.

METHODS

A cross-sectional study was conducted in the out patient department (OPD) of Urban Health Training Centre affiliated to Indira Gandhi Government Medical College, Nagpur, Maharashtra. The study population included those aged 60 years and above visiting the OPD. Critically ill patients or those unwilling to participate in the study were excluded. The study was conducted between January 2025 to March 2025.

Approval from the Institutional Ethics Committee was obtained. Patients visiting the OPD were consecutively selected till sample size was achieved. Data was collected through personal interviews of the patients using a predesigned questionnaire after obtaining written informed consent. The medications were also confirmed through any records present with the patients.

The first part of the questionnaire consisted of sociodemographic details of the participants, the second part consisted of clinical history while the third part was to assess the impact caused.

Polypharmacy was defined as taking 5 or more drugs at one time.² Adverse drug reactions (ADRs) were

unexpected and unplanned reactions to drugs, even though normal doses are being used.¹² Out-of-pocket expenditure (OOPE) in healthcare refers to the money people pay directly from their own pockets for medical services, such as doctor visits, medicines, and hospital stays.¹³

Sample size estimation

A systematic review and meta-analysis by Bhagavathula et al was taken as reference where the pooled prevalence of polypharmacy was 49%.⁹ Considering a margin of error of 8%, the sample size derived was 150.

Statistical analysis

Data was summarised as frequency and percentage or mean and standard deviation, as appropriate. Association between polypharmacy and study variables were assessed using Chi-square test. Statistical significance was considered at p value of less than 0.05.

RESULTS

Table 1 shows sociodemographic details of the participants. Mean age of participants was 69.23±5.90 years. It was seen that maximum participants 87 (58%) belonged to age group of 60-69 years and were males 79 (52.67%). Maximum patients had studied upto primary 61 (40.67%) and belonged to class IV socioeconomic class 47 (31.33%). Most patients, that is 110 (73.33%) were unemployed or retired.

Figure 1 show distribution of study participants as per morbidity. It can be seen that the most common morbidity was hypertension as seen among 68 (45.33%) followed by diabetes among 58 (38.67%) patients. Figure 2 indicates the number of medicines taken by the patients. It was observed that maximum patients 48 (32%) took 5 medicines, 39 (26%) took 4 medicines. 2 (1.33%) patients each took 1 and 8 medicines.

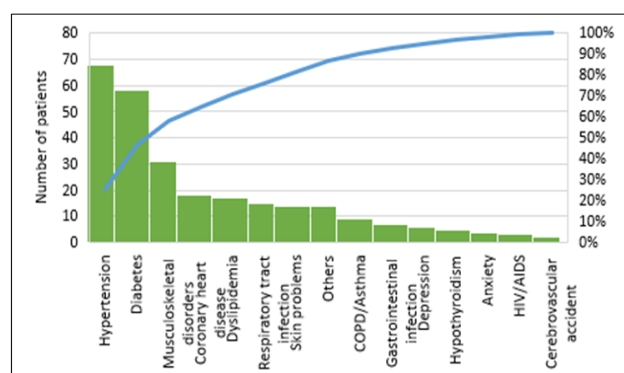


Figure 1: Distribution of study participants as per morbidity.

Table 2 shows social demographic details of the patients. Majority of the participants, 118 (78.67%) had 1 to 2

morbidities, had two or less than two hospital visits in the past 3 months, 103 (68.67%) had consulted only one doctor 89 (59.33%). 24 (16%) patients had hospital administration in the past three months and 31 (20.67%) used alternate medicines.

Table 1: Sociodemographic details of study participants.

Sociodemographic details	Frequency	Percentage (%)
Age (in completed years)		
60-69	87	58.00
70-79	53	35.33
80 and above	10	06.67
Gender		
Male	79	52.67
Female	71	47.33
Education		
Illiterate	26	17.33
Primary	61	40.67
Secondary	51	34.00
Degree and above	12	08.00
Occupation		
Employed	40	26.67
Unemployed/retired	110	73.33
Marital status		
Married	112	74.67
Widow	38	25.33
Socioeconomic status		
Class I	06	04.00
Class II	21	14.00
Class III	42	28.00
Class IV	47	31.33
Class V	34	22.67

In Table 3, association between polypharmacy and some study variables was assessed. It was seen that there was

significant association between polypharmacy and age (p value 0.018), education (p value 0.003), socioeconomic status (p value 0.005), number of morbidities (p value 0.006), number of doctors consulted (p value 0.007) and hospital admission in the last three months (p value 0.001).

Table 4 shows association between polypharmacy and its impact among the patients. It was seen that drug reactions were present among 45 (30%), 51 (34%) patients had out of pocket expenditure of more than ₹3000 per month, 51 (34%) did not adhere to their medication, history of false was present among 29 (19.33%) patients. There was significant association seen between polypharmacy and adverse drug reactions, out-of-pocket expenditure and adherence to medication among the patients.

Table 2: Distribution of study participants as per medical history.

Sociodemographic details	Frequency	Percentage
Number of morbidities		
1-2	118	78.67
3-4	32	21.33
Hospital visits in the past 3 months		
≤2	103	68.67
>2	47	31.33
Hospital admission in the past 3 months		
Yes	24	16.00
No	126	84.00
Number of doctors consulted		
1	89	59.33
2	53	35.34
3	6	04.00
≥4	2	1.33
Use of alternate medicines		
Yes	31	20.67
No	119	79.33

Table 3: Association between polypharmacy and some study variables.

Study variables	Polypharmacy, no. (%)		Total	X ² , df, p value
	Present (n=76)	Absent (n=74)		
Age (years)				
60-69	53 (69.74)	34 (46.08)	87	8.77, 2, 0.012
70-79	19 (25.00)	34 (46.08)	53	
80 and above	04 (5.26)	06 (8.11)	10	
Gender				
Male	45 (59.21)	34 (46.08)	79	2.64, 1, 0.103
Female	31 (40.79)	40 (53.92)	71	
Education				
Illiterate	20 (26.32)	06 (8.11)	26	8.67, 1, 0.003
Literate	56 (73.68)	68 (91.89)	124	
Occupation				
Employed	17 (22.37)	23 (31.08)	40	1.45, 1, 0.228
Unemployed/retired	59 (77.63)	51 (68.92)	110	
Socioeconomic status				

Continued.

Study variables	Polypharmacy, no. (%)		Total	X ² , df, p value
	Present (n=76)	Absent (n=74)		
Low	31 (39.74)	47 (60.26)	78	7.75, 1, 0.005
High	45 (62.50)	27 (37.50)	72	
Number of morbidities				
<3	53 (44.92)	65 (55.08)	118	7.32, 1, 0.006
≥3	23 (71.99)	09 (28.12)	32	
Number of doctors consulted				
1	35 (39.33)	54 (60.74)	89	11.26, 1, 0.007
≥2	41 (67.21)	20 (32.79)	61	
Number of hospital visits in the last 3 months				
≤2	47 (45.63)	56 (54.37)	103	3.33, 1, 0.067
>2	29 (61.70)	18 (38.30)	47	
Hospital admission in the last 3 months				
Yes	17 (70.83)	07 (29.17)	24	10.78, 1, 0.001
No	44 (34.92)	82 (65.08)	126	
Use of alternate medicines				
Yes	17 (54.84)	14 (45.16)	31	0.27, 1, 0.601
No	59 (49.58)	60 (50.42)	119	
Self-medication practice				
Yes	31	18	49	4.62, 1, 0.031
No	45	56	101	

Table 4: Association between polypharmacy and its impact.

Study variables	Polypharmacy		Total	X ² , df, p value
	Present (n=76)	Absent (n=74)		
Adverse drug reactions				
Present	29 (64.44)	16 (35.56)	45	4.882, 1, 0.027
Absent	47 (44.76)	58 (55.24)	105	
Out of pocket expenditure				
≤3000/month	44 (44.44)	55 (55.56)	99	4.51, 1, 0.033
>3000/month	32 (62.75)	19 (37.25)	51	
Adherence to medication				
Present	43 (43.43)	56 (56.57)	99	6.09, 1, 0.013
Absent	33 (64.71)	18 (35.29)	51	
History of falls in last 3 months				
Present	16 (55.17)	13 (44.83)	29	0.292, 1, 0.588
Absent	60 (49.59)	61 (50.41)	121	
Visit to emergency department in last 3 months				
Present	23 (53.49)	20 (46.51)	43	0.192, 1, 0.661
Absent	53 (49.53)	54 (50.47)	107	

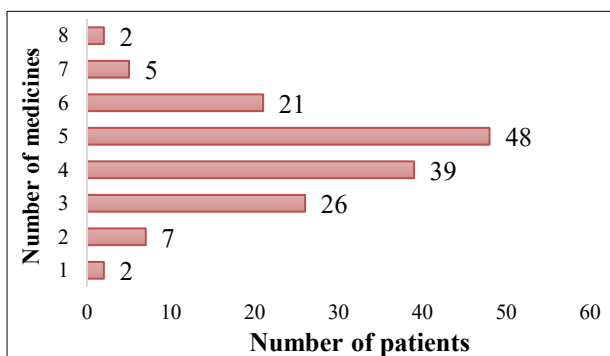


Figure 2: Number of medicines taken.

DISCUSSION

The present study was conducted to estimate the prevalence of polypharmacy among the elderly along with its associated factors and impact. In the past decade, the average number of items prescribed for each person has been increasing. The prevalence of polypharmacy in our study was 76 (50.67%).

Similarly, Rathod et al found the prevalence to be 58.3%.⁸ The prevalence was much lesser in study by Priya et al (33.7%) while Rakesh et al found the prevalence to be 66.19% in their study.^{14,15}

Sociodemographic details

In the present study, the mean age of study participants was 69.23 years. In our study, most participants belong to the age group of 60 to 69 years 87(58%) which was an alignment with findings by Priya et al 197 (53.1%) in the age group of 60 to 70 years.¹⁵ Majority of the participants in our study were males 79 (52.67%) which was in line with findings by Prasanna et al where 141 (51.45%) were males.¹⁶ In the current study, maximum patients that is 61 (40.67%) had studied up to primary level, which was similar to findings by Priya et al.¹⁵ Unemployed or retired individuals formed majority in our study 110 (73.33%), which was in alignment with findings by Anthoorathodi et al where 44 (88%) out of 51 unemployed.¹⁷ We found significant association between age and polypharmacy ($p=0.012$) and education ($p=0.003$) but not with other variables. Smet al too found significant association between polypharmacy with age and education ($p<0.001$) for each.¹⁸

Medical history

In the current study, it was seen that the most common morbidity was hypertension as seen among 68 (45.33%) followed by diabetes among 58 (38.67%) patients. Similar to our findings, Prasanna et al also found hypertension to be the most common morbidity seen among 121 (44.16%), followed by type 2 diabetes mellitus among 100 (36.5%).¹⁶ In our study, it was found that maximum patients, that is 48 (32%), took five medications, which was also observed in a study by Rakesh et al where 109 (25.6%) took 5 drugs.¹⁴ There was significant association found between polypharmacy and number of morbidities ($p=0.006$), number of doctors consulted ($p=0.007$) and hospital admission in the last three months ($p=0.001$) in our study. Similarly, Prasanna et al also found significant relationship between polypharmacy with number of chronic diseases ($p=0.005$).¹⁶ The reason for polypharmacy to be associated with number of doctors consulted can be attributed to repetitive prescription of the same drugs by multiple practitioners especially if previous medical records are unavailable. Our study also found that 49 (32.67%) patients had self-medication practices which can impact the number of medications taken. A study by Shalini et al also found 23.90% to be having self-medication practices.¹⁹ Our study found self-medication practice to be a significant predictor of polypharmacy ($p=0.031$).

Impact of polypharmacy

Previous studies have provided evidence that the probability of ADRs among geriatric patients is estimated at 6% when two drugs are taken, increases to 50% when five drugs are taken, and becomes 100% when eight or more drugs are taken simultaneously.²⁰

Polypharmacy was found to be significantly associated with adverse drug reactions. ($p=0.027$), out-of-pocket expenditure ($p=0.033$) and with adherence to medication

($p=0.013$). In a study by Lim et al, polypharmacy was found to be significant associated with any drug interaction ($p<0.001$).²¹

CONCLUSION

The prevalence of polypharmacy in our study was 76 (50.67%). The associated factors with polypharmacy were found to be age, education, socioeconomic status, number of morbidities, number of doctors consulted, hospital admission in the last 3 months. The impact of polypharmacy on adverse drug reactions, out of pocket expenditures and adherence to medications were found to be significant.

Recommendations

Precautions should be taken while prescribing multiple drugs to elderly. Past records and any concurrent consultation records should be thoroughly checked to avoid duplicate prescription of drugs. Prescription of medications should be made compulsory at pharmacies and over the counter medications should be limited. Since number of comorbidities plays a significant contributor to polypharmacy, health promotion measures in disease prevention should be implemented. Among patients required to be on multiple drugs, only drugs available through government stock should be prescribed and required stock of drugs should always be made available to avoid out of pocket expenditure.

Funding: No funding sources

Conflict of interest: None declared

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

REFERENCES

1. Masnoon N, Shakib S, Kalisch-Ellett L, Caughey GE. What is polypharmacy? A systematic review of definitions. *BMC Geriatr.* 2017;17(1):230.
2. World Health Organization. Medication Safety in Polypharmacy. Available at: <https://www.who.int/docs/default-source/patient-safety/who-uhc-sds-2019-11-eng.pdf>. Accessed on 13 April 2025.
3. Malik C, Khanna S, Jain Y, Jain R. Geriatric population in India: Demography, vulnerabilities, and healthcare challenges. *J Family Med Prim Care.* 2021;10(1):72-6.
4. Varghese D, Ishida C, Patel P, Haseer Koya H. Polypharmacy. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2025.
5. Johns Hopkins Medicine. Polypharmacy in Adults 60 and Older. Available at: <https://www.hopkinsmedicine.org/health/wellness-and-prevention/polypharmacy-in-adults-60-and-older>. Accessed on 13 April 2025.
6. Hosseini SR, Zabihi A, Jafarian Amiri SR, Bijani A. Polypharmacy among the elderly. *J Mid-life Health.* 2018;9:97-103.

7. Sinha A, Mukherjee S, Tripathi S, Dutta S. Issues and challenges of polypharmacy in the elderly: A review of contemporary Indian literature. *J Family Med Prim Care.* 2021;10(10):3544-7.
8. Rathod G, Nalini GK, Nagaral JV, Sahana GN, Deepak P, Prema M, et al. Factors associated with polypharmacy in geriatrics. *Int J Basic Clin Pharmacol.* 2017;6:1763-7.
9. Bhagavathula AS, Vidyasagar K, Chhabra M, Rashid M, Sharma R, Bandari DK, et al. Prevalence of Polypharmacy, Hyperpolypharmacy and Potentially Inappropriate Medication Use in Older Adults in India: A Systematic Review and Meta-Analysis. *Front Pharmacol.* 2021;12:685518.
10. Government of India. Ministry of Statistics and Programme Implementation. Elderly in India 2021. Available at: https://mospi.gov.in/sites/default/files/publication_reports/Elderly%20in%20India%202021.pdf. Accessed on 13 April 2025.
11. Press Information Bureau. World Senior Citizen Day 2024. Available at: <https://pib.gov.in/PressNoteDetails.aspx?NoteId=152034&ModuleId=3®=3&lang=1>. Accessed on 13 April 2025.
12. Science Direct. Adverse Drug Reaction. Available at: <https://www.sciencedirect.com/topics/pharmacology-toxicology-and-pharmaceutical-science/adverse-drug-reaction>. Accessed on 13 April 2025.
13. Press Information Bureau. The Decline in Out-of-Pocket Expenditure (OOPE) in Health in India. Available at: <https://pib.gov.in/PressNoteDetails.aspx?NoteId=153407&ModuleId=3®=3&lang=1>. Accessed on 13 April 2025.
14. Rakesh KB, Chowta MN, Shenoy AK, Shastry R, Pai SB. Evaluation of polypharmacy and appropriateness of prescription in geriatric patients: A cross-sectional study at a tertiary care hospital. *Indian J Pharmacol.* 2017;49(1):16-20.
15. Priya S, Gupta NL, Chauhan HS. Polypharmacy – prevalence and risk factors among elderly patients. Available at: https://gmch.gov.in/sites/default/files/documents/6_POLYPHARMACY_43_52.pdf. Accessed on 13 April 2025.
16. Prasanna L, Unnisa A. Prevalence And Clinical Consequences Of Polypharmacy On Medication Profile Among The Elderly In A Tertiary Care Teaching Hospital. *Asian J Pharm Clin Res.* 2020;13(6):121-6.
17. Anthoorathodi JB, Joju A, Reji AM, Asokan AP, Naseem A, Cherian A, et al. A cross sectional study on the prevalence of polypharmacy and potentially inappropriate medications among elderly patients in a tertiary care centre in central Kerala. *Int J Community Med Public Health.* 2021;8:1415-9.
18. Eltaher SM, Araby EM. Prevalence and Factors Associated with Polypharmacy among Elderly Persons. *Egypt J Comm Med.* 2019;37(3):55-61.
19. Shalini MD, Joshi MC. Study of polypharmacy and associated problems among elderly patients. *Internet J Med Update.* 2012;7:35-9.
20. Ahmed B, Nanji K, Mujeeb R, Patel MJ. Effects of polypharmacy on adverse drug reactions among geriatric outpatients at a tertiary care hospital in Karachi: a prospective cohort study. *PLoS One.* 2014;9(11):e112133.
21. Lim LM, McStea M, Chung WW, Nor Azmi N, Abdul Aziz SA, Alwi S, et al. Prevalence, risk factors and health outcomes associated with polypharmacy among urban community-dwelling older adults in multi-ethnic Malaysia. *PLoS One.* 2017;12(3):e0173466.

Cite this article as: Sastry NP, Deshmukh JS. Prevalence of polypharmacy and its associated factors: a cross-sectional study among elderly population. *Int J Res Med Sci* 2025;13:3350-5.