International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Polypharmacy and Its Association with Adverse Clinical Outcomes in Elderly Patients

Karan Srivastava[1], Yogendra Bhati[2]

[1] Assistant Professor, Department of Pharmacology, Noida International Institute of Medical Sciences (NIIMS), Greater Noida, Uttar Pradesh, India.

[2] Professor, Department of Pharmacology, Noida International Institute of Medical Sciences (NIIMS), Greater Noida, Uttar Pradesh, India.

Corresponding Author:

Karan Srivastava

Assistant Professor, Department of Pharmacology, Noida International Institute of Medical Sciences (NIIMS), Greater Noida, Uttar Pradesh, India.

Received: 07-12-2025
Accepted: 20-12-2025
Available online: 31-12-2025

ABSTRACT

Background: Polypharmacy is increasingly prevalent among elderly patients due to the rising burden of chronic diseases and multimorbidity. The use of multiple medications in older adults is associated with a higher risk of adverse clinical outcomes, including adverse drug reactions, hospitalizations, and poor medication adherence.

Objective: To assess the prevalence of polypharmacy and its association with adverse clinical outcomes in elderly patients.

Materials and Methods: A prospective, observational study was conducted over a period of six months (April 2025 to September 2025) in the Department of Pharmacology, Noida International Institute of Medical Sciences. Elderly patients aged 60 years and above were enrolled. Data on demographic characteristics, comorbidities, number of prescribed medications, and clinical outcomes were collected. Polypharmacy was defined as the concurrent use of five or more medications. Adverse clinical outcomes assessed included adverse drug reactions, hospitalizations related to medication use, and medication non-adherence.

Results: A total of 150 elderly patients were included in the study. Polypharmacy was observed in 62% of patients. Elderly patients with polypharmacy experienced a significantly higher incidence of adverse drug reactions (35.5%) compared to those without polypharmacy (14.0%). Hospitalization rates and medication non-adherence were also higher in the polypharmacy group.

Conclusion: Polypharmacy is highly prevalent among elderly patients and is significantly associated with adverse clinical outcomes. Regular medication review, rational prescribing, and deprescribing strategies are essential to reduce drug-related harm and improve patient safety in the geriatric populatio.

Keywords*: Polypharmacy, Elderly patients, Adverse drug reactions, Clinical outcomes, Medication adherence.*

INTRODUCTION

The global population is ageing at an unprecedented rate, leading to a substantial increase in the prevalence of chronic diseases and long-term medication use among elderly individuals [1]. Ageing is often accompanied by multiple comorbidities such as hypertension, diabetes mellitus, cardiovascular diseases, and chronic respiratory disorders, which frequently necessitate the use of multiple medications for effective disease management [2]. As a result, polypharmacy has become increasingly common in geriatric healthcare settings.

Polypharmacy is commonly defined as the concurrent use of five or more medications and is considered a major risk factor for adverse drug-related problems in elderly patients [3]. While the use of multiple drugs may be clinically justified in certain situations, inappropriate polypharmacy can lead to significant negative outcomes. These include

adverse drug reactions (ADRs), drug–drug interactions, medication non-adherence, cognitive impairment, falls, functional decline, increased hospitalizations, and mortality [4,5].

Elderly patients are particularly vulnerable to the harmful effects of polypharmacy due to age-related physiological changes affecting pharmacokinetics and pharmacodynamics. Reduced renal and hepatic function, altered body composition, and increased sensitivity to medications can amplify drug toxicity and increase the likelihood of adverse outcomes [6]. Additionally, the presence of multiple prescribers and lack of regular medication review further contribute to inappropriate medication use in this population [7].

Several studies conducted globally have demonstrated a strong association between polypharmacy and adverse clinical outcomes in older adults [8]. However, the prevalence and impact of polypharmacy vary across healthcare systems and populations due to differences in prescribing practices, availability of healthcare resources, and patient characteristics. In the Indian healthcare context, data on polypharmacy and its clinical consequences among elderly patients remain limited, despite the rapidly growing geriatric population [9].

Understanding the burden of polypharmacy and its association with adverse clinical outcomes is essential for promoting rational drug use and improving patient safety. Identification of patients at risk and implementation of appropriate interventions such as medication reconciliation, deprescribing strategies, and adherence to geriatric prescribing guidelines can significantly reduce drug-related harm [10].

The present study was undertaken to evaluate the prevalence of polypharmacy and its association with adverse clinical outcomes in elderly patients over a six-month period at a tertiary care teaching hospital. The findings aim to provide evidence to support rational prescribing practices and enhance the quality of pharmacotherapy in elderly patients.

Materials and Methods

Study Design
Prospective, observational study.

Study Duration
Six months (April 2025 – September 2025).

Study Setting
Department of Pharmacology, Noida International Institute of Medical Sciences.

Study Population
Elderly patients aged 60 years and above attending outpatient and inpatient departments.

Inclusion Criteria
- Age ≥60 years
- Receiving at least one prescribed medication
- Provided informed consent

Exclusion Criteria
- Terminally ill patients
- Patients unwilling to participate
- Patients with incomplete medical records

Definition of Polypharmacy
- Use of **five or more medications simultaneously**

Outcome Measures
- Incidence of adverse drug reactions
- Hospital admissions related to medication use
- Medication non-adherence

Statistical Analysis
Data were analyzed using descriptive statistics. Associations between polypharmacy and adverse clinical outcomes were evaluated using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

RESULTS

A total of 150 elderly patients aged 60 years and above were enrolled in the study during the six-month study period (April 2025 – September 2025). The results were analyzed with respect to demographic characteristics, prevalence of polypharmacy, comorbidities, and associated adverse clinical outcomes.

Demographic Characteristics

The majority of study participants were between 60 and 70 years of age. Male patients outnumbered female patients. The baseline demographic characteristics of the study population are summarized in Table 1.

Table 1: Demographic Characteristics of Study Participants (n = 150)

Parameter	Number (%)
Mean age (years)	68.7 ± 6.4
Age group 60–69 years	92 (61.3%)
Age group ≥70 years	58 (38.7%)
Male	88 (58.7%)
Female	62 (41.3%)

Prevalence of Polypharmacy

Polypharmacy, defined as the concurrent use of five or more medications, was observed in a substantial proportion of patients. Out of 150 patients, 93 (62%) were receiving five or more medications, while 57 (38%) patients were receiving fewer than five medications.

Table 2: Prevalence of Polypharmacy Among Elderly Patients

Number of Medications	Patients (n = 150)	Percentage (%)
<5 medications	57	38.0
≥5 medications (Polypharmacy)	93	62.0

Comorbid Conditions

Most patients had more than one chronic illness. Hypertension and diabetes mellitus were the most common comorbidities observed among the study population.

Table 3: Distribution of Comorbid Conditions

Comorbidity	Patients (n = 150)	Percentage (%)
Hypertension	96	64.0
Diabetes mellitus	82	54.7
Cardiovascular diseases	58	38.7
Chronic respiratory diseases	41	27.3
Others	36	24.0

Association of Polypharmacy with Adverse Drug Reactions

Adverse drug reactions (ADRs) were significantly more common in patients receiving polypharmacy. ADRs were reported in 33 (35.5%) patients with polypharmacy compared to 8 (14.0%) patients without polypharmacy.

Table 4: Association Between Polypharmacy and Adverse Drug Reactions

Group	ADRs Present	ADRs Absent	Total
Polypharmacy (≥5 drugs)	33 (35.5%)	60 (64.5%)	93
Non-polypharmacy (<5 drugs)	8 (14.0%)	49 (86.0%)	57

Hospitalizations and Medication Non-Adherence

Hospital admissions related to medication use were more frequent in patients with polypharmacy. Medication non-adherence was also significantly higher in this group.

Table 5: Association of Polypharmacy with Hospitalization and Medication Non-Adherence

Clinical Outcome	Polypharmacy (n=93)	Non-polypharmacy (n=57)
Hospitalizations	26 (28.0%)	7 (12.3%)
Medication non-adherence	31 (33.3%)	9 (15.8%)

The findings indicate that polypharmacy is highly prevalent among elderly patients and is significantly associated with adverse clinical outcomes, including adverse drug reactions, increased hospitalizations, and medication non-adherence.

Patients receiving five or more medications were at a higher risk of drug-related complications compared to those receiving fewer medications.

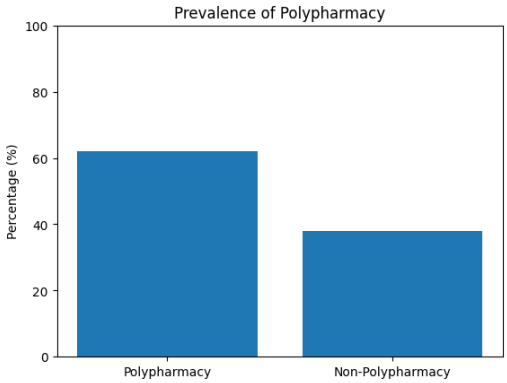

Figure 1: Prevalence of Polypharmacy Among Elderly Patients; This bar graph depicts the prevalence of polypharmacy among the study population. Polypharmacy was observed in 62% of elderly patients, while 38% were receiving fewer than five medications.

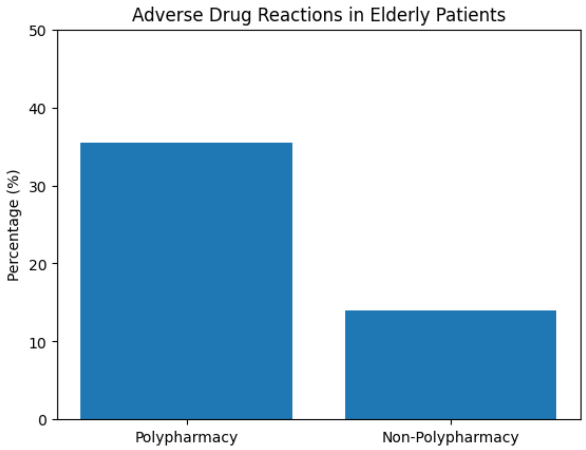

Figure 2: Adverse Drug Reactions in Elderly Patients, The incidence of adverse drug reactions was higher in patients with polypharmacy (35.5%) compared to those without polypharmacy (14.0%), indicating a significant association between multiple drug use and drug-related harm.

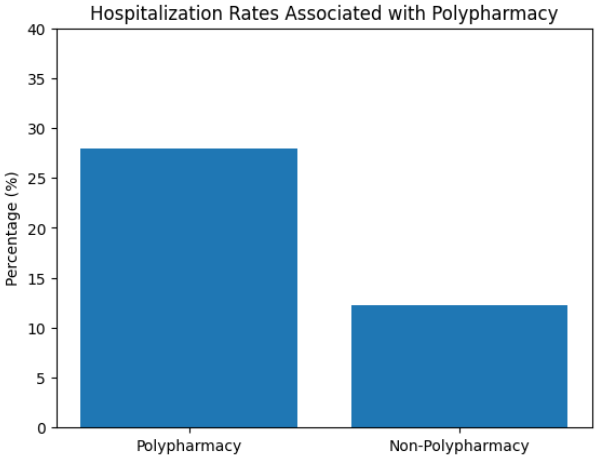

Figure 3: Hospitalization Rates Associated with Polypharmacy; Hospitalizations related to medication use were more frequent in elderly patients receiving polypharmacy (28.0%) than in those receiving fewer medications (12.3%).

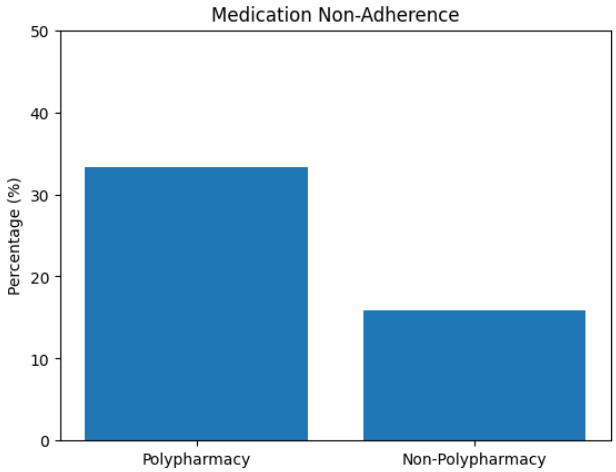

Figure 4: Medication Non-Adherence; Medication non-adherence was significantly higher among patients with polypharmacy (33.3%) compared to the non-polypharmacy group (15.8%), highlighting the impact of pill burden on adherence.

DISCUSSION

The present study assessed the prevalence of polypharmacy and its association with adverse clinical outcomes in elderly patients. The findings revealed a high prevalence of polypharmacy (62%) among the study population, which is consistent with global and Indian studies reporting increasing medication burden in older adults due to multimorbidity and chronic disease management [1,2].

Polypharmacy was found to be significantly associated with adverse drug reactions (ADRs). In the present study, ADRs were more than twice as common in patients receiving five or more medications compared to those on fewer drugs. Similar observations have been reported in earlier studies, where polypharmacy was identified as an independent risk factor for ADRs in the elderly [3,4]. Age-related physiological changes affecting drug metabolism and excretion further increase susceptibility to drug toxicity, thereby compounding the risk associated with multiple drug use [5].

Hospitalization rates were also higher among patients with polypharmacy. This finding aligns with previous research demonstrating that elderly patients exposed to multiple medications are at increased risk of drug-related hospital admissions due to adverse effects, drug–drug interactions, and inappropriate prescribing [6]. Such hospitalizations not only increase healthcare costs but also contribute to functional decline and reduced quality of life in older adults.

Medication non-adherence was significantly more prevalent in the polypharmacy group. Complex drug regimens, increased pill burden, and cognitive impairment are well-recognized contributors to poor adherence in elderly patients [7]. Non-adherence may, in turn, lead to therapeutic failure, disease progression, and further escalation of pharmacotherapy, creating a vicious cycle of increasing polypharmacy and adverse outcomes.

The findings of this study emphasize the need for rational prescribing practices in geriatric care. Regular medication review, identification of potentially inappropriate medications, and implementation of deprescribing strategies have been shown to reduce polypharmacy-related harm without compromising clinical outcomes [8]. Adherence to geriatric prescribing guidelines and involvement of clinical pharmacologists and pharmacists can further enhance medication safety in elderly patients [9].

Despite its important findings, the study has certain limitations. Being a single-center study with a relatively short follow-up period, the results may not be generalizable to all settings. Additionally, potentially inappropriate medications were not assessed using validated tools such as Beers or STOPP/START criteria. Future multicentric studies with longer follow-up and structured medication review tools are warranted to better elucidate the impact of polypharmacy on clinical outcomes in elderly patients [10].

In summary, the study demonstrates that polypharmacy is common among elderly patients and is significantly associated with adverse drug reactions, increased hospitalizations, and medication non-adherence. These findings highlight the importance of targeted interventions aimed at optimizing pharmacotherapy and improving patient safety in the geriatric population.

CONCLUSION

The present study concludes that polypharmacy is highly prevalent among elderly patients and is significantly associated with adverse clinical outcomes, including increased adverse drug reactions, higher hospitalization rates, and medication non-adherence. These findings underscore the need for rational prescribing, regular medication review, and deprescribing strategies to optimize pharmacotherapy and enhance patient safety in the geriatric population.

REFERENCES

1. United Nations. World population ageing 2020 highlights. New York: United Nations Department of Economic and Social Affairs; 2020.
2. Salive ME. Multimorbidity in older adults. *Epidemiol Rev*. 2013;35:75–83.
3. World Health Organization. Medication safety in polypharmacy: Technical report. Geneva: WHO; 2019.
4. Gnjidic D, Hilmer SN, Blyth FM, et al. Polypharmacy cutoff and outcomes: five or more medicines were used to identify community-dwelling older men at risk of different adverse outcomes. *Clin Pharmacol Ther*. 2012;91(3):556–562.
5. Mangoni AA, Jackson SHD. Age-related changes in pharmacokinetics and pharmacodynamics: basic principles and practical applications. *Br J Clin Pharmacol*. 2004;57(1):6–14.
6. Davies EA, O'Mahony MS. Adverse drug reactions in special populations – the elderly. *Br J Clin Pharmacol*. 2015;80(4):796–807.
7. Viktil KK, Blix HS. The impact of multiple prescribers on drug-related problems in older patients. *Ann Pharmacother*. 2008;42(10):1444–1450.
8. Fried TR, O'Leary J, Towle V, Goldstein MK, Trentalange M, Martin DK. Health outcomes associated with polypharmacy in community-dwelling older adults: a systematic review. *J Am Geriatr Soc*. 2014;62(12):2261–2272.
9. Scott IA, Hilmer SN, Reeve E, et al. Reducing inappropriate polypharmacy: the process of deprescribing. *JAMA Intern Med*. 2015;175(5):827–834.
10. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. *Expert Opin Drug Saf*. 2014;13(1):57–65.