

Original Article

Prevalence and Risk Factors of Polypharmacy Among Elderly Patients Attending A General Medicine Outpatient Department: Cross-Sectional Study.

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ABSTRACT

Background: Why it Matters: The more chronic conditions that elderly adults experience, the greater the risk of them being prescribed five or more medications, or "polypharmacy. It has been linked with drug side effects, drug interactions, non-adherence to medication, falls, hospitalization, and higher health care costs. The objectives of this study were to assess the incidence of polypharmacy and to identify the risk factors in elderly people visiting a general medicine outpatient department.

Objectives: To determine the prevalence of polypharmacy and identify the demographic and clinical factors associated with polypharmacy among elderly patients attending a general medicine outpatient department.

Methods: This cross-sectional study was conducted over six months in the department of Pharmacology, Khyber Medical College, Peshawar from Jan 2025 to June 2025. A total of 100 patients aged ≥60 years were recruited using consecutive non-probability sampling after obtaining written informed consent. Demographic characteristics, comorbidities, and medication histories were collected through patient interviews and medical record review. Polypharmacy was defined as the regular use of five or more medications. Data were analyzed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations were assessed using the independent t-test and Chi-square test, followed by multivariable logistic regression to identify independent predictors of polypharmacy. A p-value <0.05 was considered statistically significant.

Results: The mean age of the participants was 69.4 ± 6.8 years, and 56% were male. Polypharmacy was identified in 46 (46.0%) patients. The prevalence was significantly higher among patients aged ≥70 years (p=0.021), those with three or more chronic diseases (p<0.001), and patients with hypertension (p=0.018), diabetes mellitus (p=0.011), chronic kidney disease (p=0.027), and ischemic heart disease (p=0.034). Multivariable logistic regression demonstrated that multimorbidity (adjusted OR=3.84, 95% CI: 1.62-9.11; p=0.002) and age ≥70 years (adjusted OR=2.31, 95% CI: 1.08-4.96; p=0.031) were independent predictors of polypharmacy.

Conclusion: Polypharmacy was common among elderly outpatients and was independently associated with advanced age and multimorbidity. Routine medication review, rational prescribing, and DE prescribing strategies should be incorporated into geriatric outpatient care to minimize medication-related harm and improve therapeutic outcomes.

Keywords: Polypharmacy; Elderly; Outpatients; Multimorbidity.

INTRODUCTION

There is a very strong trend of aging of the world's population, which is causing an unprecedented rise in the incidence of chronic morbidity and health services. In older adults, chronic conditions like hypertension, diabetes mellitus, ischemic heart

disease, chronic kidney disease, chronic obstructive pulmonary disease, and osteoarthritis are common. They are often treated with medications for a prolonged period of time. This often means that the elderly take numerous medications at one time, which is referred to as polypharmacy. Polypharmacy is usually thought of as the use of five or more drugs at the same time, but some research sets the guidelines as

lower or higher depending on the circumstances. Many medicines can be clinically appropriate for multimorbidity, but too many or inappropriate medicines may impact health [1,2]. The risks of medication non-adherence, increased mortality, medication side effects, drug-drug interactions, falls, cognitive impairment, frailty, hospitalization, healthcare expenses, and increased morbidity from polypharmacy are a growing public health problem. Medications are more likely to cause problems in older persons due to changes in their physiology, which impact the absorption, distribution, metabolism, and elimination of drugs. Unnecessary medication use, in the form of inappropriate prescribing and prescribing cascades, can also lead to unhelpful use of medicines and increase patients' unnecessary risks [3,4]. Polypharmacy is attributed to several factors in older people. Older age, women's sex, multimorbidity, high rate of doctor visits, hospitalization, multiple consultations with specialists, and self-medication have all been found to be key determinants. Medication utilization patterns also may be influenced by lifestyle factors, socioeconomic status, education, and access to healthcare services. The risk of inappropriate medication use is exacerbated by the availability of over-the-counter drugs and weak health services in many developing countries [5,6]. Polypharmacy is a very variable situation in different countries and health care environments, from about 30% to over 70% among older adults living in the community or in hospital environments. Most of these differences can be explained by differences in patients' characteristics, prescribing patterns, health systems, and the definition of polypharmacy. Although the issue is gaining more awareness, data on the burden of polypharmacy among the elderly population seen in general medicine OPDs in Pakistan are scarce. An understanding of the prevalence and risk factors associated with these is essential for planning interventions to promote rational prescribing and medicines safety [7,8]. Periodic medication review has proven to be an effective tool for minimizing inappropriate prescribing and maximizing therapeutic effects. Comprehensive geriatric assessment, medication reconciliation, DE prescribing interventions, and a multi-professional approach (physician, pharmacist, and nurse) have been shown to have a

beneficial impact on preventing medication-related harm. Patients with a high risk for polypharmacy can be identified, and preventive measures can be put in place before any complications arise [9,10]. In view of the growing prevalence of chronic disease and an aging population, the assessment of polypharmacy in outpatient care settings is of growing significance. This information can help prescribers optimize prescribing patterns, establish institutional medication review programs, and use evidence-based interventions to help ensure patient safety. This study was conducted to determine the prevalence of polypharmacy and the association between demographic and clinical parameters and polypharmacy among elderly patients seen in the General Medicine Outpatient Department, Tertiary Care Hospital.

Study Objectives

To calculate the prevalence of polypharmacy in elderly patients visiting a general medicine outpatient department and find out the demographic and clinical factors which are independently associated with polypharmacy.

MATERIALS AND METHODS

Study Design & Setting

This cross-sectional study was conducted by the Department of Pharmacology, Khyber Medical College, Peshawar, with data collected from elderly patients attending the General Medicine Outpatient Department of the affiliated tertiary care teaching hospital over a six-month period from January 2025 to June 2025. The study aimed to determine the prevalence of polypharmacy and identify demographic and clinical factors independently associated with polypharmacy among elderly outpatients.

Participants

Elderly patients aged 60 years or older attending the General Medicine Outpatient Department during the study period were consecutively recruited after obtaining written informed consent. Demographic characteristics, comorbidities, medication history, and relevant clinical information were collected using a structured questionnaire and review of medical records. Each participant was enrolled only once during the study period.

Sample Size Calculation

The sample size was calculated using the World Health Organization (WHO) sample size formula for prevalence studies:

$$n = Z^2 \times P (1 - P) / d^2$$

Assuming an anticipated prevalence of polypharmacy of 50%, a 95% confidence level ($Z = 1.96$), and a margin of error of 10%, the minimum required sample size was calculated as 96 participants. To compensate for incomplete data and improve statistical precision, a total of 100 participants were enrolled.

INCLUSION CRITERIA

- Patients aged **60 years or older**.
- Patients attending the General Medicine Outpatient Department.
- Patients receiving at least one regularly prescribed medication.
- Patients willing to participate and providing written informed consent.

EXCLUSION CRITERIA

- Patients younger than 60 years.
- Critically ill patients requiring emergency management.
- Patients with moderate or severe cognitive impairment preventing reliable history taking.
- Patients with incomplete medical records.
- Patients unwilling to participate.

Diagnostic & Management Strategy

Polypharmacy was defined as the regular use of five or more medications, irrespective of therapeutic indication, in accordance with internationally accepted definitions. Medication histories were verified using prescriptions and hospital medical records. As this was an observational cross-sectional study, no clinical intervention was performed.

STATISTICAL ANALYSIS

Data were entered and analyzed using IBM SPSS Statistics version

26.0 (IBM Corp., Armonk, NY, USA). Continuous variables were expressed as mean $\pm$ standard deviation (SD), whereas categorical variables were presented as frequencies and percentages. The independent-samples t-test was used to compare continuous variables, while the Chi-square test or Fisher's exact test was applied for categorical variables, where appropriate. Variables with a p-value <0.20 in univariate analysis were entered into a multivariable logistic regression model to identify independent predictors of polypharmacy. Adjusted odds ratios (AORs) with 95% confidence intervals (CIs) were calculated. A two-sided p-value <0.05 was considered statistically significant.

RESULTS

A total of 100 elderly patients were enrolled in the study. The mean age was 69.4 ± 6.8 years, and 56 (56.0%) were male while 44 (44.0%) were female. Polypharmacy, defined as the regular use of five or more medications, was identified in 46 (46.0%) participants. Patients aged 70 years or older had a significantly higher prevalence of polypharmacy than those aged 60–69 years ($p = 0.021$). Likewise, polypharmacy was significantly more common among patients with three or more chronic diseases compared with those having fewer comorbidities ($p < 0.001$). Among individual comorbidities, hypertension ($p = 0.018$), diabetes mellitus ($p = 0.011$), chronic kidney disease ($p = 0.027$), and ischemic heart disease ($p = 0.034$) showed significant associations with polypharmacy. Variables that were significant in the univariate analysis were entered into a multivariable logistic regression model. Multimorbidity remained the strongest independent predictor of polypharmacy (adjusted OR = 3.84; 95% CI: 1.62–9.11; $p = 0.002$). Age ≥ 70 years was also independently associated with polypharmacy (adjusted OR = 2.31; 95% CI: 1.08–4.96; $p = 0.031$). These findings indicate that increasing age and the presence of multiple chronic diseases substantially increase the likelihood of polypharmacy among elderly patients attending the general medicine outpatient department.

were performed using the Chi-square test. *Statistically significant (p<0.05).

Table 3. Multivariable Logistic Regression Analysis of

Independent Predictors of Polypharmacy

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age ≥70 years	2.31	1.08–4.96	0.031*
Hypertension	1.62	0.78–3.39	0.194
Diabetes mellitus	1.81	0.89–3.70	0.101
Chronic kidney disease	1.74	0.73–4.16	0.214
Ischemic heart disease	1.53	0.69–3.38	0.292
≥3 Chronic diseases	3.84	1.62–9.11	0.002*

Variables with p<0.20 in univariate analysis were entered into the multivariable logistic regression model. AOR = Adjusted Odds Ratio; CI = Confidence Interval. *Statistically significant (p<0.05).

Table 4. Distribution of Regular Medication Use among Elderly Patients

Number of Regular Medications	Frequency (n)	Percentage (%)
1–2 medications	18	18.0
3–4 medications	36	36.0
5–6 medications	28	28.0
7–8 medications	12	12.0
≥9 medications	6	6.0
Total	100	100.0

Polypharmacy was defined as the regular use of five or more medications. Medication counts were verified through prescription records and patient interviews at the time of enrollment.

Table 1. Baseline Demographic and Clinical Characteristics of the Study Participants (n = 100)

Variable	Frequency (n)	Percentage (%)
Age (years)		
Mean ± SD	69.4 ± 6.8	-
60–69 years	58	58.0
≥70 years	42	42.0
Gender		
Male	56	56.0
Female	44	44.0
Comorbidities		
Hypertension	54	54.0
Diabetes Mellitus	46	46.0
Ischemic heart disease	28	28.0
Chronic kidney disease	21	21.0
Chronic obstructive pulmonary disease	18	18.0
Osteoarthritis	34	34.0
≥3 Chronic diseases	44	44.0

Data are presented as frequency (percentage) unless otherwise specified. Continuous variables are expressed as mean ± standard deviation (SD).

Table 2. Association between Demographic and Clinical Characteristics and Polypharmacy.

Variable	Polypharmacy Present (n=46)	Polypharmacy Absent (n=54)	p-value
Age ≥70 years	26 (56.5)	16 (29.6)	0.021*
Male	24 (52.2)	32 (59.3)	0.431
Female	22 (47.8)	22 (40.7)	0.431
Hypertension	32 (69.6)	22 (40.7)	0.018*
Diabetes mellitus	29 (63.0)	17 (31.5)	0.011*
Chronic kidney disease	14 (30.4)	7 (13.0)	0.027*
Ischemic heart disease	18 (39.1)	10 (18.5)	0.034*
≥3 Chronic diseases	34 (73.9)	10 (18.5)	<0.001*

Values are presented as frequency (percentage). Comparisons

Discussion

This study demonstrated that polypharmacy was present in 46.0% of elderly patients attending a general medicine outpatient department, indicating that nearly one in every two older adults was receiving five or more regular medications[11]. This prevalence reflects the increasing burden of chronic diseases in the ageing population and highlights polypharmacy as an important public health concern in outpatient clinical practice[12,13]. The observed prevalence is consistent with reports from other hospital-based studies, where polypharmacy among older adults has ranged from approximately 40% to 60%, depending on the healthcare setting, patient characteristics, and operational definition used[14,15]. These findings emphasize that polypharmacy remains a common challenge in both developed and developing healthcare systems. Advanced age was significantly associated with polypharmacy in the present study. Patients aged 70 years or older were more likely to receive multiple medications than those aged 60–69 years[16]. Increasing age is frequently accompanied by multiple chronic illnesses, age-related physiological changes, and greater healthcare utilization, all of which contribute to increased medication use. Similar observations have been reported in international studies, where advancing age consistently emerged as an independent determinant of polypharmacy among community-dwelling and hospital-based older adults. Multimorbidity was identified as the strongest independent predictor of polypharmacy, with patients having three or more chronic diseases demonstrating almost four times greater odds of receiving five or more medications[17]. This finding is biologically plausible because evidence-based management of chronic conditions such as hypertension, diabetes mellitus, chronic kidney disease, and ischemic heart disease often requires multiple pharmacological agents[18,19]. Previous systematic reviews and observational studies have consistently identified multimorbidity as the principal driver of polypharmacy in older adults, supporting the findings of the present study. Individual comorbidities, hypertension, diabetes mellitus, chronic kidney disease, and ischemic heart disease showed significant associations with polypharmacy in univariate

analysis. Patients with these chronic conditions frequently require combination therapy to achieve optimal disease control and reduce long-term complications. Although these individual diseases did not remain statistically significant after adjustment in the multivariable model, they contribute substantially to overall medication burden through their Coexistence within patients with multimorbidity[20]. No significant association was observed between gender and polypharmacy. Although females demonstrated a slightly higher proportion of polypharmacy, the difference was not statistically significant. Similar findings have been reported in several studies, suggesting that medication burden is more strongly influenced by the number and severity of chronic illnesses than by gender alone[21]. The findings of this study have important clinical implications. Regular medication review should become an integral component of geriatric outpatient care to identify unnecessary medications, reduce potentially inappropriate prescribing, and minimize adverse drug events. The use of validated prescribing tools, including the Beers Criteria and STOPP/START criteria, together with medication reconciliation and prescribing strategies, can improve medication safety and therapeutic outcomes in elderly patients[22]. A multidisciplinary approach involving physicians, clinical pharmacists, and nursing staff may further optimize prescribing practices and enhance patient adherence. The major strengths of this study include the use of a standardized definition of polypharmacy, systematic data collection using structured questionnaires and medical record verification, and multivariable logistic regression to identify independent predictors while adjusting for potential confounding variables. These methodological strengths increase the reliability and internal validity of the findings. Nevertheless, several limitations should be acknowledged. The cross-sectional design precludes establishing causal relationships between identified risk factors and polypharmacy. The study was conducted at a single tertiary care teaching hospital with a relatively small sample size, which may limit the generalizability of the findings to other healthcare settings[23]. In addition, medication appropriateness, treatment adherence, use of over-the-counter medications, herbal products, and potentially inappropriate medications were not evaluated. Future multicenter prospective studies involving larger populations are recommended to assess the long-term clinical outcomes of polypharmacy and evaluate the effectiveness of structured medication

review and prescribing interventions in improving health outcomes among older adults.

LIMITATIONS

There are some limitations to this study. However, it does not allow the establishment of causal relationships between the risk factors and the occurrence of polypharmacy due to its cross-sectional design. The study was carried out in a single tertiary care hospital and a small sample of 100 participants, reducing the generalizability of the research. Medication adherence, use of over-the-counter drugs, and potentially inappropriate medications were not assessed.

Conclusion

Polypharmacy was highly prevalent among elderly patients attending the general medicine outpatient department. Advanced age and multimorbidity were identified as independent predictors of polypharmacy. Routine medication review, rational prescribing, deprescribing strategies, and multidisciplinary medication management should be incorporated into routine geriatric outpatient care to reduce medication-related harm, improve patient safety, and optimize therapeutic outcomes.

Disclaimer: Nil

Conflict of Interest: Nil

Funding Disclosure: Nil

Ethical Approval

Ethical approval for this study was obtained from the Institutional Review Board (IRB) of Khyber Medical College, Peshawar, before commencement of the study (Approval No.MTI/KMC/1288/2024/04). Written informed consent was obtained from all participants before enrollment. Participation was voluntary, and participants were informed of their right to withdraw from the study at any stage without affecting their medical care. Confidentiality and anonymity of all participant information were strictly maintained throughout the study. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki (2013 revision).

Authors' Contributions

Muhammad Tamheed: Conceived and designed the study, collected data, performed statistical analysis, interpreted the findings, drafted the manuscript, and approved the final version.

Saleh Faisal: Supervised the research, contributed to study design, interpreted the findings, critically revised the manuscript for important intellectual content, and approved the final version.

Both authors meet the International Committee of Medical

Journal Editors (ICMJE) authorship criteria, have read and approved the final manuscript, and agree to be accountable for all aspects of the work.

Criteria: **All Authors**

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