



## An Understanding of Polypharmacy: Evaluation of its Risks and Benefits

Anta Sharma\*<sup>1</sup>, Hansa Choudhary<sup>1</sup>, Dr. Dharmendra Ahuja<sup>2</sup>

<sup>1</sup>Student, Department of Pharmacology, Jayoti Vidyapeeth Women's University, Jaipur, Rajasthan, 303122, India.

<sup>2</sup>Dean, Department of Pharmacology, Jayoti Vidyapeeth Women's University, Jaipur, Rajasthan, 303122, India.

\*Corresponding author's E-mail: [antasharma9@gmail.com](mailto:antasharma9@gmail.com)

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### ABSTRACT

A detailed study was performed to understand the concept of polypharmacy. Polypharmacy is expanding gradually throughout the world hence an understanding of its definition, causes, factors, consequences, prevalence, and clinical significance is necessary to achieve. The study was done with the information collected from the papers published in specified databases along with the recent online information available on the Internet. Polypharmacy is majorly observed in older adults as they are observed to have a larger number of comorbidities as compared to the other groups. An understanding of polypharmacy helps in understanding the risk associated with it in various age groups especially concerned with older age along with understanding the clinical significance of polypharmacy by relating the concept of appropriate and inappropriate use of polypharmacy. The study observes the appropriate and inappropriate behavior of polypharmacy and evaluates its risks in the patients while also highlighting why it is necessary.

**Keywords:** Polypharmacy, Hyperpolypharmacy, Adverse drug effects, appropriate polypharmacy, Inappropriate Polypharmacy.

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### INTRODUCTION

The implications of polypharmacy use over the world are starting to become a growing issue. The trend toward polypharmacy has grown as a result of the rise in comorbidities brought on by acute and chronic illnesses, which aims to give patients the best care possible while extending their lives and improving their quality of life. In addition to producing the greatest results possible, the global trend and use are also leading to several unfavorable effects that are not only seen in a small number of cases but are also seen in a significant portion of the population that includes individuals from a variety of age groups. The effect of polypharmacy on patient health is not just influenced by how many medications a person takes, but also by the necessity of those prescriptions. When five or more medications are used when they are not necessary, it is referred to as inappropriate polypharmacy. Such medicine use is degrading one's quality of life and harming the patient in addition to the patient. To minimize the majority of its causes and effects, it is crucial to recognize the difference between appropriate and inappropriate polypharmacy in terms of patient needs. The use of drugs that must be prescribed and whose scarcity could pose serious health risks is the focus of appropriate polypharmacy.

The terms polypharmacy and hyper polypharmacy are specific to the number of medications a person is taking. Hyperpolypharmacy is the intake of ten or more medicines, while polypharmacy is the intake of five or more medicines<sup>1,2</sup>. Both ideas are significant and risky in their own right. The study contains a review of the concept of polypharmacy, an assessment of its risk and clinical significance, and a discussion of its causes and effects. Additionally, it investigates the elements that contribute to polypharmacy.

### Polypharmacy

Polypharmacy word is derived from the ancient Greek word 'polus' and 'pharmakeia', polus means many and pharmakeia means the use of drugs<sup>1</sup>. The general idea reflected by the phrase combination is the administration of many drugs to a patient. The term "polypharmacy" mainly refers to the daily use of five or more drugs<sup>2</sup>. Although medicines are essential for the management of both acute and chronic health disorders, polypharmacy may sometimes develop into an unwelcome problem when it comes to taking the prescribed medications. From a therapeutic standpoint, it is necessary to prescribe a variety of drugs, but taking too many of them at once might be dangerous. Sometimes the medications that are continually taken are no longer necessary, which is referred to as inappropriate polypharmacy<sup>3</sup>. Due to multimorbidity, a higher risk of mortality, non-adherence, medication interactions, and hospitalization, polypharmacy is widespread among the elderly. In addition, polypharmacy has turned into a health burden, with an annual cost of \$2,201.17 for people in family practice, according to recent research by BS Shahid et al. The expense is expensive and has a large economic impact<sup>4</sup>. It is vital to identify those people who are more

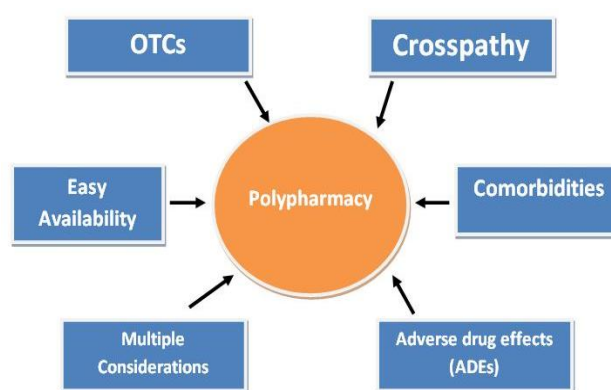


likely to get inappropriate polypharmacy to relieve this financial load and prevent the predominance of undesirable consequences related to polypharmacy. To examine the causes of polypharmacy and its prevalence, a holistic assessment of many population-based previous researches and academic works is carried out.

### Causes of Polypharmacy

Polypharmacy is accompanied by multiple numbers of causes among which few are:

- **Over-the-counter medication:** Over-the-counter medications are easily available to patients. The self-medicating pattern of patients with over-the-counter medicines without having a piece of adequate knowledge and understanding of possible adverse effects of such medicines has become a possible cause of polypharmacy. Common examples of OTCs that are used commonly are laxatives, vitamins, analgesics, and minerals. Sometimes they are not required to be prescribed or not required by the patient to be taken off but due to the psychology of the patient, they prefer to take OTCs. Isaphghula is taken by a large number of people due to their psychology of better digestion even if it is not required.
- **Alternative methods of treatment (Crosspathy):** There are large numbers of additional alternative treatments available other than allopathy which includes Ayurveda, herbal medications, etc referred to as cross paths. Accompanying the use of such medications is responsible for causing polypharmacy. This may become a safety concern as there is a high chance of herb and drug interaction with it.
- **Easy availability:** A wide range of newer medications is available in the market. Patients' curiosity towards them is another underlying cause of polypharmacy.
- **Comorbidities:** Comorbidity stands for the presence of two or more numbers of medical conditions or disease conditions in a patient. The presence of two or more diseases requires a similar number of treatments for it. The increased comorbidities have also increased the polypharmacy and hence become a cause for it.
- **Multiple consultations:** Patients and their families often want or consider multiple consultations better rather than sticking to or continuing consultation with a single physician. Sometimes they stick with each prescription without having any proper therapeutic reconciliation.
- **Adverse drug effects (ADE):** Adverse drug effects are the unwanted and unpredictable effects of the use of the drug at the usual dose. Preventable ADEs are often prescribed to avoid serious consequences which can occur with the use of inappropriate polypharmacy. This increases the number of drugs used and so is a cause for polypharmacy <sup>5,6</sup>.



**Figure 1:** Showing causes promoting polypharmacy

### Factors Associated with Polypharmacy

There are multiple numbers of patients, diseases, and healthcare-related factors which contribute to polypharmacy and its prevalence. These factors are:

- **Factors related to patients:**

Due to the likelihood of prescribing many medications to individuals with multiple chronic diseases, polypharmacy is most commonly seen in elderly people. Polypharmacy is more likely to occur in older persons who are referred to several subspecialists. While individuals who dwell in long-term care facilities are also in danger. Polypharmacy has several underlying medical problems. According to an estimate, 91% of patients receiving long-term care take at least five medications daily <sup>7</sup>. Age has a significant impact on the prescription for polypharmacy, but gender is still contested due to the studies that have shown females as having a higher risk than males for this condition and other few which say the exact opposite of it <sup>8</sup>.

The economic status of people and educational status are sociodemographic characteristics. The risk associated with entering polypharmacy might differ depending on a person's socioeconomic situation. The danger of polypharmacy related to deprivation was discovered by Nishtala et al. in their study <sup>9</sup>. It is controversial how closely a low level of education relates to polypharmacy. On the other hand, the likelihood of polypharmacy is rising due to some patient-related variables, including smoking, obesity, etc. People who live in urban areas seem to be more inclined toward polypharmacy than those who live in rural locations. According to the study, living in a nursing home is linked to a reduction in the prevalence of polypharmacy as a result of changes in the regulation of multidose dispensing and educational status. A similar study indicated that as opposed to those residing in nursing homes; polypharmacy may be caused by morbidities in the institutionalized group <sup>8</sup>. Patient behavior is one psychosocial demographic feature that supports polypharmacy. Patients may contribute to polypharmacy by opposing therapeutic modifications in their prescriptions or descriptions, or they may do so because they believe that taking additional medications would improve their health. Multiple doctor prescriptions

or changing doctors may also prevent a previous diagnosis from being reevaluated and result in improper polypharmacy<sup>8,10</sup>.

- **Factors related to disease condition**

Polypharmacy is also related to clinical problems. Polypharmacy is a common complication of cardiovascular illness, including coronary ischemic disease, heart failure, hypertension, etc. Polypharmacy is also associated with gastrointestinal diseases such as oesophageal illness and unsettled stomach. Congestive heart failure and chronic renal disease were among the ailments with the greatest frequency of polypharmacy, according to a study<sup>8</sup>.

- **Healthcare-related factors**

Polypharmacy is defined by hospitalization and consultation times. People who have recently visited a doctor and those who have been hospitalized are at increased risk of polypharmacy, according to findings. Additionally, visiting a primary care physician at least five times per year increases the chance of polypharmacy by 15; polypharmacy is also defined by the presence of numerous insurance plans and supplemental providers<sup>8</sup>.

Factors	Characteristics
Patient related factors	Age Gender (Male and female) Economic status Educational status Ethnicity Smoking Obesity Patient behaviour Multiple prescription
Disease condition related Factors	Cardio vascular diseases Gastrointestinal diseases Renal disorders
Healthcare related factors	Hospitalisation Consultation times Supplemental providers

**Figure 2:** Factors associated with polypharmacy<sup>8</sup>

### Consequences Due to Polypharmacy

According to the facts, each of those medications from polypharmacy may need to be used for important therapeutic reasons. However, polypharmacy frequently points out instances in which these supplemental drugs may be ineffective or even harmful. Polypharmacy affects patients and every healthcare system negatively. These outcomes can include a rise in the likelihood of ADR incidents, a rise in clinical readmissions, or even a rise in fatality<sup>11,12</sup>.

### Who is impacted?

Numerous studies and reports of polypharmacy have been published, even in recent media outlets like the New York Times. However, older individuals (65 years and older) are the exclusive focus of this analysis<sup>13, 14</sup>. Indeed, polypharmacy carries several negative side effects. Some geriatric syndromes and increased risks of adverse drug

reactions, drug-drug interactions, prescription non-adherence, and higher healthcare costs have all been associated with the cost of taking several medications<sup>15</sup>. Assembling the evidence for the harmful health effects of polypharmacy, with more detailed data available in the forest plots and harvest plots (supporting materials) positive corporations were discovered in the areas of fallibility, undernourishment, and elected chronic disease. Contradictory evidence was found for adverse drug events, adverse drug reactions (ADR), depression, cognitive impairment, outbursts, fractures, weight gain, functional decline, impairment, and death<sup>16,17</sup>.

### Prevalence of polypharmacy

For persistent chronic conditions, older persons commonly take multiple medications, which can result in polypharmacy (the concurrent use of 5–9 medicines) and hyperpharmacy (the concurrent use of 10 medicines). The prevalence of polypharmacy, hyper polypharmacy, and inappropriate medication use among older persons in developing countries has been the subject of numerous researches. Polypharmacy and hyper polypharmacy are exceedingly prevalent in contemporary India. Inappropriate medications are used by about 28% of older individuals in India. Therefore, suitable actions are required to promote responsible geriatric prescribing in India<sup>15</sup>.

### Possible Methods of Mitigation

It is crucial to clarify the high-risk medications that, if at all feasible, should not be used on older patients and that should be substituted in their place. The following list includes several inappropriate drugs that need to be administered with extreme caution in older populations<sup>18</sup>.

1. Anticholinergic medications
2. Sedatives/Anxiolytics
3. Narcotics
4. Cardiovascular medications
5. Other common medications (Long-acting sulfonyleureas, metoclopramide, testosterone hormone supplements, nitrofurantoin, proton pump inhibitors, NSAIDs).

### Advice for Preventing Polypharmacy Problems

1. Ensure that a complete list of medications is protected through attentive collaboration with patients and families.
2. Rearrange the EHR patient's medication list.
3. Keep an eye out for bad and inaccurate prescriptions.
4. Take care when stopping the prescription of medication.
5. Keep an eye out for indications of prospective issues during yearly health exams<sup>19</sup>.



Supporting appropriate, desirable, and pertinent improvements in response to problematic polypharmacy may not include conceptual changes in the way that drug evaluations are conducted. The affective or visceral nature of the clinician-patient connection is essential for making responsible decisions in the face of such complexity & ambiguities<sup>20</sup>.

#### Possible measures for mitigation include

- **Increased physician awareness:**

Healthcare practitioners can collaborate to spread knowledge about the value of medication reviews and the harm that results from inappropriate polypharmacy use. Mandatory training sessions for safe medication management procedures may be part of the measure. Sometimes inappropriate polypharmacy involves over-, under-, and incorrect prescription. The methods used for the identification of improper polypharmacy are the screening tools for older people's prescriptions (STOPP) and the screening tool to alert doctors to the right therapy (START)<sup>1</sup>.

- **Improved adherence and medication management:**

Finding methods to boost medication compliance and guarantee the right polypharmacy are crucial. Dispensers for pills and medication compliance tools are helpful for elderly individuals. Reminders and mobile applications can help patients take their drugs more consistently<sup>1</sup>.

- **Crosspathy reduction:**

Ayurveda, Unani, herbal, and Siddha are examples of alternative Indian medical systems that are still used today (although to a lesser level). Due to self-medication, India's heterogeneous medical culture can lead to more drug interactions. Crosspathy refers to the use of homeopathy, siddha, unani, and ayurvedic medicines in addition to allopathic ones. The patient should inform the doctor in advance about their history of receiving care from various healthcare systems. To ensure safe prescribing, appropriate polypharmacy precautions must be taken<sup>1</sup>.

- **Reduction in self-medications:**

Self-medication refers to the unsupervised intake of medication which may include the use no nonprescription drugs, traditional medications, herbal medications, supplements, etc. Efforts should be made to develop an understanding of the hazards linked with the self medications. Physicians should understand patients' psyches regarding self-medications to mitigate it to a great extent<sup>1</sup>.

#### Clinical Significance of Polypharmacy

The care of patients sometimes can become challenging as multiple medications are sometimes required to manage the complexity of the medical issue. Designing a medical regimen with multiple disease complexity is one of the critical elements of patient care. Polypharmacy however does not necessarily produce a worse effect on patients in

such cases<sup>7</sup>. Polypharmacy can consist of appropriate drugs which can improve the legibility and quality of life while causing the minimum harm. Ensuring the safety of medications in polypharmacy is a challenge. Conventional polypharmacy has been assumed as the overuse of medications; however several cases have shown that the use of polypharmacy has been proven beneficial and necessary<sup>8</sup>. The appropriate use of polypharmacy is required to be addressed to rectify the problems associated with inappropriate polypharmacy and to make it clinically significant or useful.

#### CONCLUSION

In adult populations, particularly among older adult populations, polypharmacy is quite prevalent. As indicated in the study, in addition to explaining it based on age group, it can also be described by its common exposure in patients staying in inpatient settings, those who are hospitalized, and those who attend outpatient settings regularly. Furthermore, to be crucial for the clinical site, it's critical to comprehend the implications of it. Understanding the prevalence of polypharmacy and some of the factors that contribute to it will aid in ensuring that individuals who are most at risk of being exposed to polypharmacy receive the best care possible. Clinicians must frequently assess patients to determine their need for polypharmacy as well as cut down on inappropriate polypharmacy to support patients' adherence to appropriate polypharmacy. To promote the appropriateness of polypharmacy globally, efforts should be made to mitigate it while also spreading suitable information among people worldwide.

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