

Inappropriate drug use and its consequences in elderly patients: an overview

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Abstract: *Inappropriate drug use has become a major concern of issue in elderly population. Elderly patients with multiple co-morbidities are prone for polypharmacy which could enhance the risk of drug related problems and which in turn may lead to lack of optimum clinical outcome. Inappropriate prescribing (IP) is more prevalent in elderly population with an increased risk of ADEs, increased morbidity, mortality and healthcare utilization. Worldwide incidence of inappropriate drug use is very high. One of the Indian study reveals that 7.42% of total drugs were prescribed in an inappropriate manner and 23% of total patient received at least one inappropriate drug prescription.⁹ Another study which was done in elderly population of US and Canada reveals high prevalence of inappropriate drug use around 14%-34% of the general elderly population and >40% in residences in US and Canada. various consequences of inappropriate drug use in elderly like adverse drug reaction, Medical condition initially treated with lifestyle modification, right drug to right patient, expensive drugs are prefer rather than safety and efficacy, drug-drug interaction. Several factors contributing to inappropriate drug use are pharmaceutical industry who is making business by coming out with irrational combination, prescribers are very busy so they prescribe pill for every ill, pharmacist are lacking with knowledge and confidence about drugs, patient is illiterate cant understanding language of medication label or leaflet, government is not having strict control on promotion or advertising of pharmaceutical product. It will overcome by prescribing cautiously, conduct regular review of prescription, consider non-pharmacological treatment and psychological factors, use of appropriate formulation, avoid symptomatic prescribing.*

I. Introduction

Inappropriate medication use has been defined as the use of medications that either should be entirely avoided or should be avoided at excessive dosages or else that should not be used for excessive duration of treatment.^{1,2} Good health and access to effective and economically appropriate medicines is the fundamental right of human being. The experts from World Health organisation (WHO) conducted several studies which indicated that half of all medicines globally used are irrationally prescribed and having serious consequences like adverse drug reactions, drug resistance, protracted illness and even death. These studies point out major misuse and misconceptions of medicines by prescribers, dispensers as well as consumers. The appropriate use of drugs is an essential element in achieving quality of health and medical care for patients and the community.³ Population aging is considered as major serious concerned in developed country and is going to be threat for developing countries as it is associated with various physiological changes and diseases. Education and care provider regarding drug use is playing more important role in compliance to geriatric population. There are various studies indicating physician's prescribing medicine which causes harm to elder population. The prescription for older population is basic component of care. The selection of pharmacotherapy for elder population is complex and challenging process. Incidence of chronic disease and degenerative pathologies are higher in elderly population thus there is need for improving their healthcare & this should be priority for all the nations.⁴ Elderly population is fast growing in India from 5.6 per cent in 1961 is projected to rise to 12.4 per cent of the population by the year 2026. With an increasing share of population it is natural to expect an increase in the problems associated with them as well. Health problems are the major concern of the Indian society and it is estimated that one out of two elderly people in India suffers from at least one chronic disease which requires life-long medication. It is reported that use of medications has increased significantly among the elderly in the last decade. In India the extent of research activities on drug related problems (DRPs) in elderly patients is found to be less. The survey in developing country reveals that as per population size and existing problems in

rational drug use are high.⁵ In India, the drug information resources are not well updated thus it may lead to shortcomings in terms of authenticity, accuracy of drug information in general and specific age group of patients.⁶ Higher drug demands by elder people has lead to increased coverage of outpatient prescriptions by third-party insurance, continues introduction of new drugs to manage chronic diseases and changes over of medications from prescription to non-prescription status.⁷ Inter-individual variability in health, disease and disability increases substantially with ageing, which is a gerontological principle known as aged heterogeneity which means the health status of elderly people ranges widely from those who are fit to those who are frail and this makes generalisation of prescribing decisions difficult for clinicians.⁸

Inappropriate drug use has become a major concern of issue in elderly population. Elderly patients with multiple co-morbidities are prone for polypharmacy which could enhance the risk of drug related problems and which in turn may lead to lack of optimum clinical outcome. The 10 to 20% of hospital admissions are drug-related and associated with a higher mortality than any other reasons for hospitalization.⁹ In spite of the fact that elderly people are reported to be half the total drug usage population, less than 5% of randomized controlled trials have been designed for people over 65 years. With limited evidence available to guide prescription, it tends to depend on data available for younger subject. Now days the biggest challenge is to prescribe safe drugs in elderly patients. The use of lists of potentially inappropriate drugs must be considered as a tool to identify sub-optimal treatments, which may be due to not receiving the effective drug or due to receiving inadequate doses.¹⁰ An assessment of the safety and efficacy of inappropriate medications in older adults requires clinically relevant objective outcomes and pharmacological measures of medication exposure. Important outcomes include geriatric syndromes and objective measures of physical function. Measurements of medication exposure have evolved from merely counting the drugs to a consideration of pharmacologic principles such as drug class, dose response, and maximal effect. Emerging evidence regarding the effects of cumulative medication exposure on functions critical for independence may provide guidance for prescribers.¹¹ The chronic diseases leads to polypharmacy but the safety and efficacy information of those medications in geriatrics are not revealed up to the mark. The geriatrics are excluded from clinical trials due to lower reserve capacities and slower homeostatic mechanism. Polypharmacy leads to adverse drug reaction thus there is need to improve inappropriate prescribing which is possible by identifying the quantity & types of prescribing problems.¹² Drug therapy is the most powerful interventions to improve health outcomes in the elderly.¹³ Health care team should do simple intervention like reinforcing the importance of taking the prescribed medication and encouraging use of pill calendar boxes, which improve adherence and overall compliance with drug therapy.¹⁴

Incidence Of Inappropriate Drug Use:

Inappropriate prescribing (IP) is more prevalent in elderly population with an increased risk of ADEs, increased morbidity, mortality and healthcare utilisation. Inappropriate prescribing consists of use of medicines that having more risk than benefit, particularly where safer alternatives exists. It includes misuse of medicines (inappropriate dose or duration), prescription of medicines with clinically significant drug-drug and drug-disease interactions and importantly the under-use of potentially beneficial medications. It can be detected using explicit (criterion- based) or implicit (judgement based) prescribing indicators.¹⁵ Number of studies has been documented in hospital setting, nursing homes on inappropriate prescribing of medication in elderly population with various chronic pathologies.

In India one of the study was carried out at medicine out patients department which reveals that 7.42% of total drugs were prescribed in an inappropriate manner and 23% of total patient received at least one inappropriate drug prescription.⁹ In another study on inappropriate multiple medication and prescribing of drugs documented high prevalence of inappropriate drug use around 14%-34% of the general elderly population and >40% in residences in US and Canada. Few studies carried out in northern European countries, estimated prevalence of inappropriate prescribing was 12.5%-20%.¹⁶ One retrospective study was carried out from 2002 - 2005 to describe the prescribing pattern among elderly diabetic-hypertensive patients in relation to their age and sex and to examine the existence of prescribed drugs considered potentially inappropriate for these elderly patients. The most common therapeutic groups encountered were anti-diabetics (100%), anti-hypertensive's (100%) and analgesics (96%).¹⁷ A study showing use of inappropriate medications in home-dwelling elderly population is conspicuously low but the use of certain drugs like benzodiazepines, amitriptyline hydrochloride, ergot mesyloids, muscle relaxants, and meprobamate which are considered inappropriate with different medical conditions are relatively high.¹⁰ The world population of aged 60 plus is 600 millions, i.e. 10% of world population and number is expected to reach up to 2 billion by 2050 estimated by United nations. Number of elder population in India was 70.6 million, or 6.9% of the total population in 2009 It is projected that the number of older persons will be 94.8 million in 2011 (or 8.3%), and 143.7 million by 2021 (or 10.7%). Further, 63% of the total elderly population is in age group of 60-69 years, 26% in age group of 70-79 years and 11% in age group of 80 years and above.

Several gender studies of the elderly suggest that the life expectancy of women is expected to be higher than men. In 2006-2010, the life expectancy of female is 68.1 in comparison to 65.8 of males which is expected to rise to 72.3 for females as compared to 69.02 for males during the period 2011-2016. This indicates that the population of elderly women will account for a larger population as compared to their male counterparts. Similarly location demographics highlights that elderly population living in rural area (75%) is more than urban area (25%).¹⁸ The elderly population becoming victim of inappropriate prescribing like Adverse Drug Reaction, Drug-Drug Interaction, Adverse Drug event etc. The poor choice of medication is the key for minimising ADRs.¹⁹ The proportion of adverse drug event in elderly patients ranges from 5 percent to 35 percent as per annual estimation. In one retrospective study, 17 percent of outpatients reported a problem related to a prescribed medication,^[9] and in recent study, elderly population living in the community, the rate of adverse drug events was 5 percent per year and very less prospective data are available on the incidence of adverse drug events in the ambulatory care setting.²⁰ A study has been done in Nepal shows that medication errors are usual finding of the hospital, 30% of problems are occurring due to medication error which leads to hospitalization. Errors are occurred at any stage of care, from medication selection to drug administration. The proportion of elderly population in Nepal, is although low but it may steadily increase according to the census, stated as 4.2% in 2001.²¹ One of the review article on inappropriate prescribing and adverse drug events in older people stated that high prevalence in elderly population with up to 24% of community-dwelling patients and 40% of nursing home residents in the United States regularly receiving at least one potentially inappropriate medicine according to Beers' criteria. Prevalence of inappropriate prescribing is somewhat lower in Europe as compare to United States, though comparative studies are limited due to different methodologies. According to START criteria, one study found that 58% of older patients do not receive one or more clinically indicated medications due to Under-prescribing which is even more widespread. Risk factors for inappropriate prescribing include older age, polypharmacy and multiple attending physicians.¹⁵ Medicare beneficiaries are national social insurance programme administered by the US government in 1965 they analysed 19.6% of patients who had been discharged from a hospital were rehospitalized within 30 days, and 34.0% were rehospitalized within 90 days.²² One of the study from Belgium concluded potential inappropriate were found in 144 of the 302 older persons. Prevalence of inappropriate prescribing of medications is 48 % of frail older patients received an inappropriately prescribed medication (PIM) according to STOPP and 63 % had a prescribing omission (PPO) according to START. Inappropriate prescribing according to the STOPP and/or START criteria led to hospital admissions of 82 of the 302 patients (27.1 %) for the various medical problems like Fall with fracture, Bleeding, Heart failure, Ischaemic heart disease, stroke, COPD exacerbation, and the medications involved are Aspirin, NSAID, platelet aggregation inhibitors, statin, Antithrombotic agent, ACE inhibitors, Anticholinergic & β_2 agonist. Fifty-four of the 302 admissions (17.9 %) were related to PIMs, of which 46 involved a fall associated with a major fracture. The latter 46 patients were receiving 66 inappropriately prescribed drugs (35 benzodiazepines, 13 opiates, 12 neuroleptics and 2 antihistamines) at home. The proportion of PIM-related admissions for a fall with a fracture in patients inappropriately receiving fall-risk increasing drugs was 67.6 %.²³ Inappropriate prescribing leads to Adverse Drug Reaction. One of the study had been conducted in south India suggest that among 920 patients enrolled, 296 patients (32.2%) experienced 419 ADRs. Among all ADRs, 48.4% (203) were preventable and majority of ADRs [226 (53.9%)] were moderate in severity. Drugs frequently associated with ADRs were anti-diabetics [76 (18.1%)] and antibiotic for systemic use [54 (12.9%)]. ADRs increased the hospital stay in 5.9% (54) of patients. Female gender was observed as the influential risk factor for ADRs.²⁴ A prospective observational study has been conducted in Bangalore Karnataka to evaluate prescribing pattern for geriatric patient which screened total of 106 case records of geriatric inpatients in medicine wards, they found most of the cases were from respiratory system (35.84%), followed by cardiovascular system (14.15%). The most commonly prescribed drugs were antimicrobials (16.94%). Polypharmacy was observed in 94(88.67%) patients. According to Beers criteria, 23(21.69%) patients were prescribed inappropriately & the above mentioned categories of drugs were to be generally avoided in older adults.²⁵

Consequences Of Inappropriate Drug Use:²⁶

- A drug prescribed for a disease which causing adverse drug reaction is generally accompanied by other drug to treat it but rather, we can taper the dose or replace the respective drug. Examples are drug induced Parkinsonism, depression, insomnia, constipation and several other problems.
- Medical condition like abdominal pain, insomnia, high blood pressure, mild adult-onset diabetes, obesity, situational depression should be first treated by changing lifestyle. Physician can take total history for these medical abnormalities so that medicine prescription if possible can be avoided. Medical condition will be well treated by lifestyle modification.
- Medical problems are not going to resolve when right drug is not prescribed for right indication. Example antibiotics are prescribed in the viral condition like cold & bronchitis.

- Sometime drugs prescribed for treatment of medical conditions are expensive or less preferable drug instead of safe, effective and preferable to treat disease.
- Drugs are prescribed to treat particular medical condition are sometimes interact with each other. Each on its own may be safe but together they can cause serious injury or death.
- Drugs from same therapeutic class are uses to treat disease condition, adding of one drug to another is not going to increase effectiveness but it will increase the risk to the patient life. Example CVS drugs or mind affecting drugs are fixed combinations used.
- Sometime right drug is prescribed but in high dose. Elderly patients having less metabolism and excretion rate than younger. Same problem is with paediatric patients who get dose twice or thrice than their requirement.

- **FACTORS CONTRIBUTING TO INAPROPRIATE DRUG USE:**²⁷

- 1. Pharmaceutical industry:**

Pharmaceutical industries are gaining profit as they come out with irrational combinations and non-essential formulation like vitamin tonics. They may provide biased information regarding pharmaceuticals to the physician through leaflets or medical representative. They only provide technical information related to drug not respect to patient. They cannot provide consumer product information.

- 2. Physicians / prescriber:**

Advertisement, promotional claims and their influences, bias of drug company research as published in the medical journal can attract doctors towards more favourable impressions about drug. Physicians are very busy due to heavy patient load into their outpatient department. They are having 5-10 minutes to spend on single patient. In short time they are unable to explain “how to use prescription drug or what precaution should be taken” to the patient. Sometimes due to busy schedule they prescribe pill for every ill which causing adverse drug reaction or drug-drug interaction. Many physicians prescribed brand names so there is chance of duplication of therapeutic equivalents. Use of broad spectrum antibiotic for every primary and secondary healthcare levels which leads to spread of antibiotic resistance.

- 3. Pharmacist:**

Misleading to the professional ethics pharmacists working for pharmaceutical companies insist to the physician to switch patient from drugs made by the company. Pharmacist is not offering professional services in their pharmacies to the patient due to lack of confidence, poor knowledge, lack of financial benefits and lack of training. Sometimes pharmacies are running by non-pharmacist.

- 4. Government:**

Government is not having strict control on promotional claims and advertising of Pharmaceutical products. Drug policies are mainly aimed towards pharmaceutical industries than patient. Priority is given to technical and commercial matter like drug Price control and licensing of manufacturer over initiative to ensure that medication are Used reasonably.

- 5. Patient:**

Majority of patients in India cannot read and understand English language as all the medication labels are in English. So there are language barriers to the patient to understand about their medication. Majority of Indian population lying below line of poverty. Low income is the another contributing factor for inappropriateness as patient not going to spent money for purchasing medication.

How to overcome inappropriate drug use:²⁸

- Prescribe cautiously to elder patients as per metabolic changes. There is need to pay attention to differences in normal ageing and due to specific treatable diagnosis. Selection of appropriate therapeutic agent is important before prescription. Various trials shows therapeutic agent associated with higher risk of adverse drug event in older patient so keep considering those agents while prescribing.
- For appropriate prescribing to elder patient one should follow the following guide.
 1. Balance the potential harm and benefits of a given agent.²⁸
 2. Conduct a regular review of older patient’s prescriptions and assess the risk/benefit balance in an ongoing fashion; medicines which appear to have no benefit, or are producing unacceptable adverse effects should be stopped.
 3. Consider non-pharmacological treatments for common symptoms like dizziness, insomnia and headache.

4. Psychological factors such as recent bereavement and social isolation should be considered and addressed before reaching for the prescription pad.
5. When prescribing prophylactic medications, consider whether it is appropriate in the context of the whole person and their co-morbidities, the risks of taking the medication, the likelihood of compliance and the population from which the original evidence of effectiveness was identified.
6. Older patients should not be denied preventative pharmacological agents such as warfarin and statins but their use should be carefully considered.
 - Use appropriate formulation in elderly as sometimes they have problem of swallowing. If drugs are prescribed in tablet formulation it will cause ulcer to them because tablet will remain in mouth. Consider liquid formulation in such patients if tablet are prescribed then advice to take along with plenty of water.
 - Avoid symptomatic prescribing, conduct a thorough assessment and attempt to reach a diagnosis before prescribing. Make sure that your not prescribing therapeutic agent to normal aspects of ageing like alteration in sleep or walking cycle.
 - Consider the effect of non-prescribed medication. Collect proper history before prescribing. Patient should be enquired regarding medical and medication history. Patient may be on another drug for another medical condition or may be on over the counter drug which could be interacting with prescribed drug. Assess patient understanding about their medication therapy that is how to take, when to take etc.

Factors should be considered while prescribing are, is it need to prescribe certain therapeutic agent, limit the range of the drug while prescribing, start low dose of certain drugs which can be slowly increased, prescribe lowest number of therapeutic agent and avoid multiple or complex regimen, avoid imprecise prescribing such as 'as directed', providing full dose, frequency and route, on first and repeat prescriptions, take care to review medication after it has been started and assess whether or not it should be continued long-term, Use your colleagues to help you achieve the best for your patients and try not to practice in isolation, prescribe cost effective drugs, always asses cost with quality of drug, use various resources for appropriate prescribing.²⁹

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