Review Article

Polypharmacy in elderly people: A Simple Review

ABSTRACT

With increasing age, there is chance of developing different chronic conditions which are often accompanied by use of multiple medicines that can lead to polypharmacy which can be defined as use of five or more medicine which include the one that has been prescribed, over the counter (OTC) as well as complementary medicine. Geriatric people particularly those with multiple co-morbid health conditions, may develop polypharmacy with high risk of Adverse Drug Events (ADE) and Drug Interaction (DI). Presence of multiple co-morbidities makes them the highest consumer of pharmaceutical drugs, so a high degree of caution is required while prescribing drug to the elderly population. Concept of Deprescribing and several tools like Medication Appropriateness Index, ARMOR (Assess, Review, Minimize, Optimize, and Reassess), and START/STOPP (Screening tool for older persons potentially inappropriate prescription/ Screening tool to alert doctors to right treatment) etc have emerged as practical guides to solve problems related to polypharmacy and these tools should be considered by the prescriber while prescribing the drug to the elderly population.

Keywords: Polypharmacy; co morbidity; Deprescribing; Geriatric.

INTRODUCTION

With advancing age, pharmacokinetic and pharmacodynamic changes occur. Pharmacodynamic changes involve altered sensitivity to different classes of drug whereas; pharmacokinetic changes include changes in absorption, distribution, metabolism and excretion of drugs [1]. Among older population various physiological changes like losses in hearing, seeing and moving occurs as well as the increased risks for developing chronic diseases like dementia, heart disease, stroke, chronic respiratory disorder, diabetes and osteoarthritis [2]. With increasing age, there is chance of developing different chronic condition which are often accompanied by use of multiple medicines that can lead to polypharmacy. The term “Polypharmacy” is defined as use of five or more medicine which includes the one that has been prescribed, over the counter (OTC) as well as complementary medicines [3]. Geriatric people particularly those with multiple co-morbid condition may develop polypharmacy with high risk of Adverse Drug Events (ADE) and Drug Interaction (DI) [4]. Due to altered pharmacology of ageing, presence of multiple medical

conditions and exclusion of elderly patients from clinical trial often leads to under prescribing and over prescribing to elderly patients. Adverse drug events can be seen which can cause morbidity and mortality in this subgroup of population as well as having an economic impact [5].

Uses of these different medicines such as Hypnotics, Sedative, NSAIDs (Non Steroidal Anti-inflammatory Drugs), etc. increase the chance of side effect and adherence to the therapy can be compromised [6]. Presence of multiple co-morbidities makes them the highest consumer of drugs, so a high degree of caution is required while prescribing drug to elderly population [7].

One of the main challenges for General Practitioners (GP) has been medical care for elderly people. Due to natural ageing process, the elderly often experience multiple chronic disease as well as decrease in both organ function and physiological reserves. Therapeutic confusion can be seen among younger GPs as the choice of medicine to prescribe becomes a complex process for each particular disease. Adverse side effects can be seen in elderly which can be up to seven times more frequent in comparison with younger patients. Responsible clinicians must consider possible Drug-Drug interaction and pharmacokinetic dynamic of ageing body while providing therapy for elderly patients [8, 9]. Application of published guideline for a hypothetical 79 years old woman with Chronic Obstructive Pulmonary Disease (COPD), Type II Diabetes Mellitus (DM), Osteoporosis, Hypertension (HTN) and Osteoarthritis led to use of 12 medicines and a complicated non pharmacological regimen with high risk of adverse interaction between drugs and disease [10]. As, polypharmacy is common phenomenon it can be associated with use of Potentially Inappropriate Medication (PIM) in geriatric population. PIM can be defined as: “A drug in which the risk of an adverse event outweighs its clinical benefit, particularly when there is a safer or more effective alternate therapy for the same condition” [11]. A person on PIM is associated with potential Drug Related Problem (DRP) and increase in healthcare cost and utilization compared to those people who are not on PIM [12]. DRP is defined as the event or circumstances associated with drug therapy that can noxious, unintended and can interfere with desired health outcome. Elderly patients are at high risk of experiencing DRP because of their complex medical problem and use of multiple drugs. The number of DRP like incorrect drug choice, dose too low or too high, no clear indication, etc increased with number of medication used. An effective strategy should be developed to reduce the risk of mortality, morbidity, and hospital readmission associated with DRP [13]. The biggest problem faced by health care professional is the lack of adequate evidence and knowledge about response of elderly patients to drug because of the elderly patients are excluded from the clinical trials [14].

It is essential for health care professionals to be aware of the medication needs of geriatric people and also follow guidelines and tools to formulate hospital policies and protocols to meet those needs adequately. Promoting both quality of life as well as better and safer prescribing practice in elderly people can be achieved by providing education, reporting DRP and further increasing the doctor patient interaction [15]. Use of PIM was associated with increase in cost in case of elderly which can be alleviated by use of program like continuing medical education program as well as providing education and training to doctors on rational prescribing [16].

Polypharmacy is an important issue in the elderly which involves Adverse Drug Reaction (ADR). Incidence of adverse drug reaction and interaction increases with polypharmacy in elderly due to altered metabolism and excretion of medications. Since ADR are a significant cause of morbidity and mortality as well as important cause for hospital admission, minimizing polypharmacy is an important consideration. The general principle of "Start Low, Go slow but Use enough" should be considered to achieve desired therapeutic effect in elderly [17].

The general objective of this review is to provide knowledge regarding use of polypharmacy in elderly, consequences relating use of polypharmacy and a brief idea about effective strategy to minimize the use of polypharmacy, so that appropriate decision is made regarding therapy which can improve quality of life, avoid complication and reduce financial burden in case of geriatric population.

1. EPIDEMIOLOGY

The prevalence of polypharmacy found in different literature varies greatly ranging from 4% to about 57% [18]. A study had shown the variation in prevalence of polypharmacy in between 10% to 90% in different population [19]. Likewise, another study found out the prevalence of polypharmacy ranging from 26.3% to 39.9%. Beside, the countries with the lowest prevalence of polypharmacy was found out to be Switzerland, Croatia and Slovenia while Portugal, Israel and Czech Republic being highest in terms of prevalence [20].

Another study found out that polypharmacy was seen in 58.6% and inappropriate medication use were seen in 70% of residents in geriatric age group residing in selected nursing homes in Singapore [21] . Similarly, a retrospective study conducted in Nepal on prescribing pattern to geriatric patient at Tribhuvan University Teaching Hospital (TUTH) medical ward showed that polypharmacy was prevalent indicating considerable scope for improving geriatric prescribing practice in TUTH medical ward [22]. A study done on intermediate care nursing home showed that, from admission to discharge the prevalence of PIM has been increased from 24% to 35% [23]. A study showed that 44% of elderly patient were taking PIM and 33% patient were taking drugs that contribute serious Drug-Drug interaction [24]. A Meta analysis showed that twice as much elderly people are hospitalized due to an ADR than non elderly patients [25]. According to IMS (Intercontinental Marketing Statistics) Institute for Health care informatics estimates, in year 2012 AD health care cost exceeded nearly $200 billion due to improper and unnecessary use of medicine and avoidable health care cost from mismanaged polypharmacy among elderly resulted in $1.3 billion in United States Health Care System [26].

From the above statistics, we can clearly see there is increase in prevalence of polypharmacy ranging from 4% to 58.6% [18, 21]. This increase in use of polypharmacy can be associated with increase in use of PIM among elderly population which can contribute to serious Drug-Drug Interaction and ADR.

2. FACTORS CONTRIBUTING POLYPHARMACY

One of the common etiologies contributing to polypharmacy is the lack of primary care physicians and use of multiple prescribers as well as pharmacies. Depending on convenience, distance and cost, patients may go to more than one pharmacy to receive medication. The problem with this is that it often leads to incomplete medication histories, which can result in multitude of problems that can cause more medications to be prescribed than necessary.

Another factor contributing to polypharmacy is the expectations patients have in being prescribed medication at every visit. Polypharmacy is mostly seen in older adults having different level of impairment ranging from cognitive to developmental. Further, elderly having co-morbid conditions are also at the highest risk for developing polypharmacy. Likewise, keeping poor medical records of patients can be as considered another risk factor at the healthcare system level as those patients are more likely to get refills for old medications that have been discontinued by the prescriber [27 – 33].

3. CONSEQUENCES OF POLYPHARMACY

Polypharmacy has been linked to a number of complications among the elderly [34]. Concomitantly administered drugs can lead to drug interaction resulting in declining therapeutic effect and increase in occurrence of ADR. Elderly patients also fail to adhere to the drugs prescribed that contain multiple drugs or regimens that can lead to decrease in patient compliance and ultimately therapeutic failure. Likewise, sometime due to polypharmacy, therapeutic duplication can occur that can be associated with overdosing [35].

One of the major consequences of polypharmacy can be hospitalization. Several studies in community dwelling elderly as well as nursing home resident have shown a link between polypharmacy and hospitalization [36-38]. Likewise, studies done on Taiwan [39], Australia [40], and Korea [41] also have shown the association between polypharmacy and hospitalization. The relationship of frailty with polypharmacy is still unclear but the association is highly prevalent in case of elderly and more research is required in this area to explore the relationship between frailty and polypharmacy [42, 43]. Further, other consequences of polypharmacy that can be seen in elderly can be increase in risk of falls [44-46]. Polypharmacy has also been associated with cognitive impairment and associate with development of dementia [47, 48]. A low score was seen in Mini Mental State Examination (MMSE) of those participants with polypharmacy [49]. Likewise, association between physical impairment and polypharmacy was also see in elderly [50, 51]. Therefore, the prescriber should be cautious and follow guideline while prescribing the drug in order to prevent the different consequences and decrease the risk of mortality in case of elderly population [52, 53].

4. ASSESSMENT TOOLS FOR POLYPHARMACY

Several tools have emerged as practical guides to solve the problems related to polypharmacy but all those are based on Interventional trials [54]. Tools like MAI (Medication Appropriateness Index) may have value in providing a structure and process for clinical learners to conduct a comprehensive review of complex drug regimen taken by older adults [55]. Others tools like STOPP/START (Screening tool for older persons potentially inappropriate prescription/ Screening tool to alert doctors to right treatment) criteria have been considered while providing therapy to elderly patients. The list can help practitioners on their daily work and reduces the chance of both medication error and inappropriate prescription in elderly population [56]. A Beers criterion was also developed to assist healthcare practitioners to improve medication safety and quality of care in older adults. It is mainly concerned with the reduction of exposure to PIM (Potential Inappropriate Medication) as polypharmacy can lead to use of inappropriate medication in elderly population [57, 58]. The criteria can guide clinicians in making decision about safe use of drug in the elderly and encouraged them to carefully consider the risks of various drugs. Furthermore, these criteria can be integrated in electronic health record where instant feedback on suggestion for alternative can be given for a particular inappropriate medication [59].

5. MANAGEMENT

Polypharmacy can be associated with greater health care costs and an increased risk of ADE, drug-interactions, medication non-adherence, reduced functional capacity and multiple geriatric syndromes.
Health care professionals must try to make effort to identify a diagnosis for every medication on the list and can ask a series of question like:

- Is the indication for which the medication was originally prescribed still present?
- Are there duplication in drug therapy from the same class, and does the list include medications prescribed for an adverse reaction?
- Are the medication dosages therapeutic and, is there any significant drug-drug or drug-disease interaction?
- Have non pharmacological treatment been considered whenever possible?

Tools like ARMOR (Assess, Review, Minimize, Optimize, and Reassess) are used to evaluate polypharmacy in older adults. This tool is a systematic and organized stepwise approach that begins with first assessing current medications, minimizing non essential medications, optimizing medications by addressing duplication and adjusting dosages, and reassessing the patient for functional, cognitive and clinical status along with medication adherence. This tool considers a patient's functional ability and clinical status in an effort to balance best prescribing practice with the patient's physical profile so that a patient's quality of life is improved [60].
The key for treating the elderly is to find the right drug at the right dose and for the shortest possible duration on an individualized basis. Non pharmacological treatment should be considered whenever

possible. Further developing safe and evidence based medicine regimen and determining benefit to risk ratio helps to minimize polypharmacy and the risks associated with it [61]. Two issues must be addressed in near future; first being introducing strategies and intervention to improve prescribing appropriateness and second the patient need to make clear about taking more medicine to prevent disease or disability often lead to potential harm from Potentially Inappropriate Prescription (PIP) drugs [62].
Introducing a specialty of geriatric medicine in developing countries is indispensable in order to safe guard geriatric population from poor health and a life of destitution, exploitation or neglect [63]. There is also a need of separate geriatric nursing care units as well as training for nursing staff in order to provide geriatric care for elderly patients [64].

The role of clinical pharmacist in optimizing prescription and rational use of drug in elderly involves different approaches like pharmaceutical care, medication reviews and educational interventions. Clinical pharmacists can play a proactive role in performing medication review and provide education to other health care professionals. In conclusion, optimizing prescription in elderly involve integrated approach that involves physician, clinical pharmacologist, clinical pharmacist and patient [65, 66].

5.1. APPROACHES TO DEPRESCRIBING

A concept of Deprescribing has been introduced which is part of good prescribing that provide the concept of backing off if the dose seem too high or completely stopping the intake of medicine if they are no longer needed i.e. the prescriber should reduce the number of dose if the dose amount is too high and even completely stop the use of medicine if the medicine is therapeutically not required by the patient [67]. Reduction in number of drug intake can be associated with decrease in adverse event and improvement in quality of life [68]. Physicians should include the concept of deprescribing while planning the treatment plan; discuss potential deprescribing with patient [69]. Patients are interested if they are included in treatment plan and their frequency of medicine intake is reduced [70]. Certain things like patient's overall health, therapeutic goal, compliance and willingness to deprescribe should be considered while going through the deprescribing process [71]. However, more research is needed regarding Benefit/Risk of continuation and discontinuation of certain medicine and one should also be knowledgeable regarding appropriate time to discontinue certain medicine for better result [72].

5.2. GOOD PRESCRIBING PRACTICE [73, 74]

Before starting a new drug accurate medical and medication history must be obtained in order to avoid drug-disease and drug-drug interaction. If possible non pharmacological treatment should be considered and must treat underlying cause rather than symptoms. The drug that are not indicated or having no benefits should be stopped. Only clear indication drug should be prescribed and such indication should be documented in order to avoid use of unnecessary drug. Furthermore, each physician or medical prescriber must be cautious while adding new medicines and must make sure to choose the safest

medicine as possible in an alternative way. The drug regimen should be simple with appropriate administration system. The therapeutic goal should be discussed with patients and they should be explained regarding the drug, its uses, ADR, how to take medicine, duration of treatment etc. Further pharmacokinetic or pharmacodynamic changes that are likely to occur in elderly and their effect on dosing requirement can also be taken in consideration.

After starting a drug the therapeutic response must be documented and if necessary the dose must be increased in order to achieve the desired effect. The developed symptom must be assumed to be dose related until proved in order to prevent prescribing cascade. Further monitoring patient for possible adverse effect and re-evaluating the need to continue drug therapy or to stop medicine that have no beneficial effect can also be done.

Medication reconciliation should occur at time of admission, transfer and discharge which ensure transfer of information about drug regimen at any transition point in health care system. The process includes verification of all drugs that patient are taking and comparing with physician's order. Programs like computerized physician ordering program can be used that can alert clinicians to problems like allergy, dose reduction, drug interaction, impaired function and allows clinicians to monitor patient for possible adverse effect. Electronic prescribing can be used which minimizes prescribing and administration error. It helps to anticipate confusion due to sound alike and look alike drug name e.g. Chlorpropamide and Chlorpromazine in which Chlorpropamide is oral hypoglycaemic drugs whereas, Chlorpromazine is a Neuroleptics.

6. CONCLUSION

Geriatric people particularly those with multiple co-morbid condition makes them highest consumer of drugs which can lead to polypharmacy so a high degree of caution is required while prescribing drug to elderly population in order to prevent the consequences of polypharmacy. Concept of Deprescribing and several tools like MAI, ARMOR, and START/STOPP etc have been emerged as a practical guide to solve problem relating polypharmacy and these tools should be considered by the prescriber while prescribing the drug to the elderly population. These tools can act as guideline to the prescriber while prescribing the drug to geriatric patients. Further, these tools can be useful to pharmacist and other health care professionals in assessing the appropriateness of prescription before dispensing medication to geriatric patients and suggesting a safer alternative by consulting with physician so that proper decision is made regarding the appropriate choice of drug in elderly population.

Sufficient study on medicine used in Geriatric should be carried out in order to know the exact percentage of inappropriate prescription used in geriatric patients. The elderly patients who are on medication need to be knowledgeable regarding the drug so that:-

- Appropriate decision is made regarding the right choice of drug.
- Quality and efficacy of medical care given to elderly can be increased.
- Use of safer alternative and avoidance of complication can be achieved.

- Reduction in financial burden can be achieved.

CONSENT

It is not applicable

ETHICAL APPROVAL

It is not applicable

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