

## Geriatric Pharmacology: What to Consider While Prescribing to an Elderly Person?

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Elderly is the person above 65 years of age. Elderly Suffer from or having chances of Alzheimer's disease, Parkinson's disease, vascular dementia, stroke, visual impairment, cataracts and macular degeneration, atherosclerosis, coronary heart disease, heart failure, diabetes, arthritis, osteoporosis, and fractures, cancer, incontinence. Hence, they need a greater number of drugs for the treatment. There are changes in responses to some drugs with advanced age and also the drug usage patterns changed due increase in number of drugs. Many diseases, nutritional problems and reduced financial resources lead to reduced dosing compliance in elderly [1].

There are several pharmacokinetic and pharmacodynamics changes that occur in geriatric patients.

There are changes the drug elimination. There is age related decrease in renal function. Blood urea nitrogen (BUN) and serum creatinine levels are markers for renal function. BUN gives idea about concentration of urea in blood, much of this is obtained from ingested protein. Malnourished old person does not consume more protein hence no more increase in BUN in elderly. Serum Creatinine is produced by muscles. As muscle mass decreases, there is no enough production of creatinine to reflect changes in renal function. Hence, normally appearing BUN and creatinine level in elderly under estimate degree of renal failure. Dosing recommendations is done by the Cockcroft-Gault formula in elderly patient. This formula can be applied for the ages 40 - 80 years. For women, the result should be multiplied by 0.85 (because of reduced muscle mass) [2,3].

Changes in drug absorption also happens in advanced age. Altered nutritional habits and Greater consumption of nonprescription drugs like antacids & laxatives, Changes in gastric emptying – like slow in older in diabetics which affect the drug absorption. [1].

Likewise, changes in drug Distribution will be there with changes in body mass and body water. in elderly, there is decrease in lean body mass and body water and increase in body fat. Volume of distribution (Vd) is altered by decreased lean body mass and decreased body water and increase in body fat. Lipid soluble drugs like Diazepam have increased Vd whereas water soluble drugs like Lithium have decreased Vd. If clearance of drug is affected, half-life and steady state plasma concentration of the drug will be changed. Woman have less body mass and hence volume of distribution may be affected. Reduced albumin cause increase in unbound fraction of drug to very high level. Hence, watch for therapeutic and toxic concentration of drugs like phenytoin which is highly bound to albumin. Hence, Therapeutic range given for therapeutic drug monitoring in non-elderly patient is not an accurate guide for efficacy as well as toxicity in geriatric patient [4-6].

Aging process in elderly leads to decreased liver mass and decreased hepatic blood flow and reduced hepatic metabolism by  $\frac{1}{4}$  which affect the drug metabolism. Regional blood flow to liver at 65 years is reduced by 40-45% at the age of 25 years [7]. Reduced clearance of drug depend on hepatic metabolism and hepatic blood flow (1<sup>st</sup> pass effect). Hence, metabolism of the drugs like Verapamil, Lidocaine and labetalol is affected as depend hepatic

blood flow [8].

Elderly is more sensitive to the action of many drugs. These changes in results are due to altered pharmacokinetics or diminished homeostatic responses. Elderly is more sensitive to some sedative-hypnotics and analgesics. There is decrease in responsiveness to adrenoceptor agonists. Certain homeostatic control is blunted with the advanced age in elderly. Physiologic alterations in response are seen in elderly. Average blood pressure goes up with age. Incidence of symptomatic orthostatic hypotension increased. 2-hour PP blood glucose increased by about 1 mg/dL for each year of age above 50. Temperature regulation is also impaired, and hypothermia is poorly tolerated in the elderly [1,9,10,11].

Major changes that happen with the aging process are: forgetting to take one's pill related to cognitive changes associated with vascular or other pathology. Economic stresses due to reduced income and increased expenses due to illness. Most important change is loss of a spouse [1].

Drug like antihistaminic, hypnotics and hidden contents in Herbal drug can cause incontinence, confusion, fatigue, depression, and many times these symptoms are attributed to disease condition. Gingko cause bleeding when used with Aspirin. These problems can be modified by appropriate diagnosis and therapeutic actions. There is need for high index of suspicion for drug induced illness in elderly. Any symptoms in an elderly patient may be a drug side effect until proved otherwise [1].

Hence for prescription of drugs in elderly careful drug history and analysis of the prescription for rationality of the medication in elderly patient is needed. Disease to be treated may be drug-induced [1]. Principals of prescription in elderly mention that there should be high index of suspicion for drug reactions & interactions and know the other drugs the elderly patient is being taking. By knowing the drug taken by elderly we can simplify regimen as much as possible when multiple drugs are prescribed and can reduce the number the drugs taken by the elderly person [1].

Polypharmacy and inappropriate prescribing are well known risk factors for adverse drug reactions which commonly cause adverse clinical outcomes in older people [12].

Prescriber should be aware of the all the medication the patient is taking and accurate and thorough medication history is needed. Prescriber can specifically ask about prescription medications, over-the-counter products, as needed (prn) medications, vitamins and minerals, herbal products, home remedies and other health care providers prescription since the patient's last visit with you [13].

Adverse drug reactions can be prevented if physician had high index of suspicion for drug induced illness in elderly. Any symptoms in an elderly patient may be a drug side effect until proved otherwise. Physician can carry out brown bag analysis -here the patient is asked about the to bring the all medications in bag and checked for duplicate prescription (multiple treating physicians) and total number of medications can be reduced by 30-50% [13].

Prescriber to keep in mind that disease to be treated may be drug-induced hence a careful drug history is necessary. Usually, start with small doses and titrate to the response desired. Whenever pharmacokinetic data is not available, dose can be started as ½ of adult dose (split the tablet or increase the dose interval). Always keep high index of suspicion for adverse drug reactions and interactions. Know other drugs that patient is taking. Simplify regimen as much as possible when multiple drugs are prescribed to the elderly. Try to use drugs that can be taken at the same time of day by the elderly. If no expected response appears,

### Bibliography

1. Katzung BG. "Special Aspects of Geriatric Pharmacology". In Basic and Clinical Pharmacology 2018; Katzung BG Editor, 14<sup>th</sup> Edition, Mc Graw Hill Education (India) Private Limited, Chennai (2018): 1058-1067.
2. Cockcroft DW and Gault MH. "Prediction of creatinine clearance from serum creatinine". *Nephron* 16 (1976): 31-41.
3. Friedman JR., et al. "Correlation of estimated renal function parameters versus 24-hour creatinine clearance in ambulatory elderly". *Journal of the American Geriatrics Society* 37 (1989): 145-149.
4. MacLennan WJ., et al. "Protein intake and serum albumin levels in the elderly". *Gerontology* 23 (1977): 360-367.

5. Greenblatt DJ, *et al.* "Importance of protein binding for the interpretation of serum or plasma drug concentrations". *Journal of Clinical Pharmacology* 22 (1982): 259-263.
6. Conti MC, *et al.* "Serum albumin level and physical disability as predictors of mortality in older persons". *JAMA* 272 (1994): 1036-1042.
7. Mooney H, *et al.* "Alterations in the liver with aging". *Clinical Gastroenterology* 14 (1985): 757-771.
8. Vestal RE, *et al.* "Antipyrine metabolism in man: influence of age, alcohol, caffeine, and smoking". *Clinical Pharmacology and Therapeutics* 18 (1975): 425-432.
9. O'Malley K, *et al.* "Determinants of anticoagulant control in patients receiving warfarin". *British Journal of Clinical Pharmacology* 4 (1977): 309-314.
10. Shephard AMM, *et al.* "Age as a determinant of sensitivity to warfarin". *British Journal of Clinical Pharmacology* 4 (1977): 315-320.
11. Gurwitz JH, *et al.* "Aging and the anticoagulant response to warfarin". *Annals of Internal Medicine* 116 (1992): 901-904.
12. Gallagher P, *et al.* "STOPP (Screening Tool of Older Persons' Prescriptions)/START (Screening Tool to Alert Doctors to Right Treatment) criteria for potentially inappropriate prescribing in older people: version 2". *Age and Ageing* (2014): 1-6.
13. Leipzig RM. "Geriatric Pharmacology and Drug Prescribing for Older Adults". In: Soriano, R.P., Fernandez, H.M., Cassel, C.K., Leipzig, R.M. (eds) *Fundamentals of Geriatric Medicine*. Springer, New York, NY (2007).