

# QUARTERLY MEDICAL REVIEW

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## CLINICAL GERIATRICS WITH SPECIAL EMPHASIS ON NUTRITION IN ELDERLY

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## CLINICAL GERIATRICS WITH SPECIAL EMPHASIS ON NUTRITION IN ELDERLY

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## CLINICAL GERIATRICS WITH SPECIAL EMPHASIS ON NUTRITION IN ELDERLY

### Introduction

*Nutrition says "Some eat to live and some others live to eat but my duty is to cater to everyone."*

*An elderly says "I am sorry but you don't cater to me properly, probably because of which I fail to get the amount and type of nutrient necessary to meet my energy needs."*

*Ultimately nutrition says "what people eat is not calories but food and consideration of fads, flavors and floating variations of appetite which may result in misinterpretation of the dietician's theories."*

*Nutrition is defined as "the science of food and its relationship to health." Good nutrition means maintaining a nutritional status that enables us to grow well and enjoy good health. In the global campaign of Health for all, promotion of proper nutrition for the elderly is one of the 8 elements of the primary health care. Greater emphasis has been given to formulate a national dietary goal to promote health and nutritional status of families and communities. International activities in the field of nutrition initiated by the League of Nations, later continued by FAO, WHO and UNICEF contribute a great deal to achieve the goals.*

*The word 'nutrients' is used for specific dietary constituents such as proteins, vitamins and minerals that are not synthesized in the body in adequate amounts especially in elderly. Therefore they must be supplied in every balanced diet.*

### Aging and Nutrition

Aging was described by A Comfort *et. al.* as a process of deterioration- a decrease in viability and increase in vulnerability. Nutrition is the sum of processes involved in taking the nutrients, assimilating them and utilizing them as per the need. Nutrients are the nourishing substances that are not synthesized in the body in sufficient amounts and therefore must be supplied by the diet. Nutrition in the elderly involves several different areas, including assessment of food intake, nutritional status such as :

- a) Anthropometric
- b) Bio-chemical
- c) Clinical assessment
- d) Physical activity
- e) Energy expenditure
- f) Environment

Nutritional problems are common in the elderly and undoubtedly many of them are preventable but a good understanding of the intricacies of human nutrition is required coupled with a thorough monitoring of nutrition and the nutritional status.

Prevalence of malnutrition in the elderly community of the developing countries is very common. Even the elderly in developed countries such as U.K. and U.S.A. suffer from deficiency of nutrients as revealed from the DHSS survey.

The clinical features of malnutrition can be divided into clinically obvious features and sub clinical nutrient deficiency features such as fatigue, irritability, loss of appetite, anxiety etc. However in good number of cases nutritional supplementation hardly improves the health problem of these groups, except improving iron and vitamin B complex status.

The principal problem in diagnosing is that overt clinical signs may indicate a comparatively late stage of the disease and by this time much sub clinical damage and distress may have gone uncorrected. It is note worthy that in most surveys in the elderly with malnutrition, the clinical signs are very rarely apparent. The presumptions could be low intake of energy and nutrients in the diet to low levels of relevant nutrients in the blood. Different studies in the NHANES data document that calcium, perhaps iron and vitamin B group are most likely to be deficient in the diet of the elderly, but overt clinical signs of malnutrition of these substances are hardly apparent.

A survey in Geriatric wards, residential institutions or even homes in Ireland revealed that intake of potassium, magnesium, vitamin D, Vitamin B<sub>6</sub> was most likely to be deficient. Bio-chemically albumin, calcium, iron, folate, vitamin B<sub>12</sub>, ascorbic acid, thiamine, riboflavin, vitamin B<sub>6</sub>, D and A were found to be low, therefore intake of these substances should be increased.

The prevalence of malnutrition in the elderly in the developing countries was found to be wide spread. Malnutrition has been found to be rare in the developed countries and in a study comprising of population of developed countries, malnutrition was observed in 6% of men and 5% of women under the age of 80.

The Age Related Physical and Structural Declines (ARPSDs) which affect nutrient and food intake are the following :

- 1) Reduced energy metabolism and BMR in view of the structural and functional decline of the thyroid and the adrenal cortex consequent upon aging. This is corroborated by lack of physical activity and appetite. Energy intake needs to be reduced. The Department of Health and Social Security (DHSS) survey revealed that the energy intake is 2-8% less in persons beyond 65 years of age.
- 2) Alterations in the G.I. tract :
  - ❖ Decreased salivation, loss of teeth leading to improper mastication resulting in decreased food intake and preference for liquid and soft mashy diets which lead to deficiency of different types of fibres, minerals and vitamins.
  - ❖ Decreased gastric acidity resulting in reduced rate of absorption of iron and calcium.
  - ❖ The enzymatic activities of digestive juices are decreased leading to malabsorption of fat and other essential nutrients.
  - ❖ The sense of taste and smell are less in old age leading to decreased quantity of food intake.

- ❖ Reduced muscle tone of the intestine leads to decreased movement resulting in constipation, abdominal distension and flatulence.

Most of the elderly individuals are vulnerable to nutritional deficiencies due to following reasons:

- 1) Economic dependence - 70-80% of the elderly in India depend on their care giver's income which is most of the time insufficient.
- 2) Institutional dwellers, isolated individuals are dependant on others. Socially isolated individuals and victims of depression and dementia are more prone to nutritional deficiency.
- 3) The following is a brief outline of several nutrients, their roles and benefits in the aging process are as follows :

<b>Nutrient</b>	<b>Physiological role</b>	<b>Specific role in aging process</b>
Iron	Immuno-competence	Preventing predisposition to infection
Iron/folate	Synthesis of haemoglobin	Maintaining appropriate level of activity
Calcium	Bone formation	Preventing osteoporosis
Selenium	Anti-oxidant	Preventing free-radical damage
Vitamin A, Vitamin C, Vitamin E, Lycopene	Anti-oxidant	Preventing free-radical damage

In an extensive survey in the U.K, the energy and other nutritional requirements as well as the percentage of 'recommended intake' was observed to be as follows and the values have been compared with a nutritional survey in Kerala, India.

	<b>Men</b>				<b>Women</b>			
	<b>65-74</b>		<b>75+</b>		<b>65-74</b>		<b>75+</b>	
	<b>U.K.</b>	<b>India</b>	<b>U.K.</b>	<b>India</b>	<b>U.K.</b>	<b>India</b>	<b>U.K.</b>	<b>India</b>
Energy	98	89	98	86	92	83	97	79
Protein	125	99	126	98	126	94	129	94
Calcium	182	99	177	98	159	92	145	90
Iron	120	88	110	86	90	72	90	70
Thiamine	110	86	100	79	100	79	100	78
Riboflavin	100	98	88	88	100	98	85	80
Ascorbic acid	143	102	127	199	133	102	113	100
Vitamin A	151	99	146	98	137	98	118	90

In the DHSS survey on 841 elderly subjects in U.K., 27 were found to be having malnutrition. Twelve had protein calorie malnutrition, 2 had angular stomatitis and 2 had scurvy. The situation is more precarious in India. In a recently concluded survey in Kerala, 27-35% had evidence of malnutrition as compared to only 2% in other European countries. This study also concluded that the factors that are commonly supposed to render the elderly vulnerable to malnutrition are apathy, alcoholism, ignorance, disinterest in food, food faddism, limited mobility, loneliness, social isolation, mental disturbances, ill-fitting dentures and poor dentition.

The housebound, who accounted for 12.6% of the survey population over the age of 70, were the most important single group at risk of malnutrition. The higher incidence of malnutrition among the housebound was associated with significantly smaller dietary intakes and abnormalities of bio-chemical measurements for certain nutrients. In particular, the housebound women had a poorer vitamin D status than the non-housebound subjects, which was probably attributable to not taking vitamins and (for vitamin D) to a lack of exposure to sunlight. Since housebound elderly people are a readily identifiable group, they present the best opportunities for prophylaxis of malnutrition.

Single clinical signs and isolated biochemical findings were considered to be unreliable evidence of malnutrition. The diagnosis required an assessment of all the information available from clinical, dietary, biochemical and hematological studies.

Nutrients are substances that are not synthesized in the body in sufficient amounts, more so in the elderly. For maintenance of good health, the nutrients can be divided into two sub groups : Energy Providing Nutrients (EPNs) and Non Energy Producing Nutrients (NEPNs). EPNs are protein, carbohydrate and fats and NEPNs are vitamins, minerals, trace and ultra trace elements. In a study in Kerala, it was observed that the NEPNs must be supplied in the elderly. As regards EPNs, energy intake (E.I.) should be calculated as per Resting Energy Expenditure (REE). For normal weight elderly, EI should equal to REE. For under weight elderly, energy intake should be more than REE and for over weight, the reverse. The average daily energy intake is 2800 Kcal for American men and 1800 Kcal for American women. For Indian elderly a 10% deduction for age and another 10% deduction for body size and activity level can be made. Therefore an average Indian elderly male should be provided with  $2800 - 560 = 2240$  Kcal per day and an average Indian elderly female would need  $1800 - 360 = 1440$  Kcal daily. The calculated REE is then adjusted as per the physical activity level. For the elderly individuals with sedentary lifestyle, REE should be multiplied by 1.2 and for elderly individuals with mild to moderate activity, REE should be multiplied by 1.4.

Dietary proteins consist of both essential and non essential amino acids. The essential amino acids must be supplied in adequate amounts in the elderly. If energy intake is inadequate because of ailments, protein intake should be increased because amino acids are diverted into the pathways of glucose synthesis and oxidation. In extreme energy deprivation, Protein Calorie Malnutrition (PCM) ensues rapidly in elderly. The Recommended Daily Allowance (RDA) for protein in elderly is about 0.6 to 0.7 gm/kg per day assuming that the protein is of high biological value. The proteins of high biological value are animal proteins followed by proteins from legumes (beans), cereals (rice, wheat, corn) and roots. Combinations of animal and plant proteins that complement

each other must be provided to increase the biological value and lower total protein requirement. The tolerance to proteins is decreased because of compromised renal and hepatic function in the elderly. Moreover, normal amount of protein intake could precipitate dementia in the elderly with compromising renal and hepatic function, but not in other cases. A healthy diet should have 10-20% of calories from proteins. Fat is a concentrated source of energy and constitutes on an average 15-25% of total caloric intake. At least 45-55% of total calories should be derived from carbohydrates. The brain requires about 100 g per day of glucose for fuel and other tissues use about 50 g per day.

**Water :** 1-2 ml. of water per Kcal of energy expenditure is sufficient under usual conditions. Special attention must be paid to the water needs of the elderly, who have reduced total body water and blunted thirst sensation and may be taking diuretics.

Malnutrition is frequent in the elderly and is found in around 70-80% of hospitalized elderly and in up to 50% of non institutionalized elderly. Malnutrition in elderly results from lack of intake of food or starvation, abnormal assimilation of the diet, stress of illness and abnormal nutrient metabolism. Chen et al defined malnutrition in the elderly as inadequate nutritional status using standard assessment techniques and insufficient dietary intake for any reason. The prevalence of malnutrition in the elderly is higher than what is expected. In a recent report, 53% of male patients and 61% of female patients admitted to the hospital and 49% males and 57% females in old age homes or other non family institutions, and 43% males and 51% females in home settings are malnourished. It is unfortunate that the treatment of infections or heart failure is the major concern of doctors and hospitals rather than taking care of nutrition.

Malnutrition leads to impairment of adaptive and immune function initially followed by decline in the function of every organ system of human body. Therefore it is said that there is decrease in survivability and increase in vulnerability. Risk of infection and death increases many fold.

Outcome of nutritional support is highly yielding. Healing of fracture neck of femur, prevention and treatment of bedsores, pneumonia, UTIs etc. are better with meticulous nutritional support. Cancer treatment is made more effective with good nutritional support. Weight gain in low weight elderly leads to improvement in dementia, immune function and the vigour to fight any disease under the earth.

Nutritional screening programme should primarily aim at searching the causes which can be underlined by using the following mnemonic (WEIGHT LOSS) :

**W** Wandering and forgetting to eat

**E** Emotional problems

**I** Insufficient funds

**G** Gastrointestinal tract problems

**H** Hypo- or hyperthyroidism or other endocrine problems

**T** Tremors or other neurological problems interfering with feeding

**L** Low salt and other unappetizing diet

**O** Oral problems

**S** Swallowing problems

**S** Shopping and food preparation difficulties

All patients over the age of sixty should be subjected to nutritional screening by an organized nutritional support service upon indoor stay. Risk factors for ambulated patients include socio economic status, recent unintended weight loss and decreased oral intake for more than 5 days, increased gastrointestinal losses, co-morbid health status and depression.

Mini Nutritional Assessment (MNA) developed by Nestle is an excellent tool for initial nutritional screening. It is so simple that any medical or paramedical staff could use this for screening of under nourished elderly.

Other “malnutrition risk factors” include certain medical conditions such as chronic bronchitis and emphysema, dementia, long-term effects of gastrectomy, difficulty in swallowing, poor dentition and certain social factors : conditions associated with being housebound, men living alone, having no regular cooked meals, bereavement, being in social classes IV and V and in receipt of ‘malnutrition risk factors’ were particularly prone to malnutrition.

The factors responsible for rendering the elderly vulnerable to malnutrition are apathy, alcoholism, ignorance, isolation, mobility and mental disturbances, disinterest in food, food faddism, poverty, ill fitting dentures and poor dentition. These are corroborative to the risk factors such as chronic bronchitis, dementia, depression, post gastrectomy sequelae, swallowing difficulties and house bounded ness, living alone, bereavement and people of poor social classes. The housebound, accounting for 12.6% of the population over the age of 70, were the most important single group at risk of malnutrition. This is all because of significantly smaller dietary intakes and none or less of regular cooked meals. In particular the housebound women had a poorer vitamin D status because of lack of exposure to sunlight.

### **Clinical Nutritional Assessment :**

- 1) Physical examination
- 2) Bio-chemical measurements
- 3) Meticulous Health Screening to search for diseases and disabilities

**Physical examination** includes a thorough medical, nutritional, dietetic and clinical examination of the eyes, oro-pharynx, skin, hair and nails.

Dependant edema and stigmata of hepatic insufficiency such as ascites, dilated veins over anterior abdominal wall and jaundice should be looked for.

Height, weight and Body Mass Index (BMI) should be calculated. Though both height and weight tend to decrease after the age of 60, but sudden weight change is clinically significant to search for diseases especially cancers.

The formula of weight change (%) = 
$$\frac{\text{Usual weight} - \text{Actual weight}}{\text{Usual weight}}$$

Rapid weight loss over 2% in one week, 5% in one month, 7.5% in three months and 10% in six months is considered severe and pathological.

Other anthropometric measurements are not informative in the elderly because of changes in skin turgor. Triceps skin fold and mid-arm muscle circumference measurement are made for baseline documentation.

**Bio-chemical measurement :** Serum albumin of less than 3gm % is significant in absence of infection, stress and fluctuations in water balance.

Serum pre-albumin (transthyretin) is a better assessment tool both for diagnosis as well as monitoring of repletion.

Serum transferrin can be used as a protein marker. In Iron Deficiency Anemia (IDA) the level is increased.

Insulin-like Growth Factor-1 (IGF-1) is a useful indicator of malnutrition. Levels decreased dramatically with caloric deprivation and returned promptly to pre morbid level with adequate nutritional repletion. Its usefulness in Geriatric Practice is tremendous.

Other general laboratory parameters include haemogram, estimation of iron, vitamin B<sub>12</sub> and folate, analysis of Blood Urea Nitrogen (BUN), Glycaemic Profile, Electrolytes etc. Thyroid functional status and hormonal assessment to search for adrenal insufficiency should be done in selected cases.

## **OSTEOPOROSIS IN ELDERLY :**

Osteoporosis refers to the process of generalized weakness of bones. Bone structure depends on three factors such as bone density, bone quality and bone weight. Like any organ system of the human body, weakness results in progressive functional decline and bone weakness results in fractures, specifically known as fragility fractures.

The National Institute of Health in the US developed a consensus definition of Osteoporosis by the year 2000 which states “Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing the person to an increased risk of fractures”. It is prevalent in postmenopausal women but does not spare the males. The Osteoporosis Society of India predicted the number of Osteoporotic patients to be exceeding 26 million by the year 2003 and projected to increase to 36 million by the year 2013. The clinical and radiological diagnoses do not exceed 10-20% because of the lack of awareness of general public in this regard.

The gender difference of Osteoporosis is because of :

- Decline of ovarian function at the post menopausal age
- Lower peak bone mass consequent upon an imbalance between Osteoblastic and Osteoclastic activities in elderly females.

- Inadequate exposure to sunlight
- Lack of physical exercise
- Higher incidence of thyroid disorders in females

Osteoporosis is operationally defined based on the quality of Bone Mineral Density (BMD) that may be compared with the peak bone mass in a young adult of the same race and sex (T-score). WHO has defined normal bone density as T score between +2.5 to -1 SD; Osteopenia as T score between -1 to -2.5 SD; Osteoporosis as T score below -2.5 SD and established or severe Osteoporosis as T score below -2.5 SD in presence of one or more fragility fractures. The reference data provided by the DEXA manufacturers are derived from Caucasian postmenopausal women. In absence of normative data from other races, these criteria have been widely accepted and used in clinical practice. Recent data reveal that these criteria may not be applicable to Indians. It is likely that these reference norms may lead to over diagnosis of osteopenia/osteoporosis in a substantial number of Indian patients.

### **Individuals to be screened for osteoporosis :**

Osteoporosis is most often asymptomatic and every postmenopausal woman cannot be screened for osteoporosis especially in a country like India. Therefore the emphasis should lie on case finding.

Screening is warranted in the following risk groups :

- Postmenopausal women with certain risk factors to be described below
- Patients with osteoporosis related fractures
- Patients with osteopenia or spinal deformities on x-rays
- Patients on steroids for more than 6 months
- Males with hypogonadism and other risk factors
- Risk factors for osteoporosis

### **Risk factors for Osteoporosis :**

#### **Genetic factors/Personal factors :**

- ✓ Low BMI (<19)
- ✓ Familial prevalence
- ✓ Early menopause (<45 years)
- ✓ White/Asian>Blacks
- ✓ Oophorectomy/hysterectomy

#### **Life style factors :**

- ✓ Smoking

- ✓ Alcoholism
- ✓ Physical inactivity
- ✓ Low calcium intake
- ✓ Lack of exposure to sunlight

**Drugs :**

- ✓ Long term steroids
- ✓ Dilantin sodium
- ✓ Replacement therapy (thyroxine, hydrocortisone)
- ✓ Heparin, warfarin

**Medical disorders :**

- ✓ Primary hyperparathyroidism
- ✓ Thyrotoxicosis
- ✓ Addison's disease
- ✓ Cushing's syndrome
- ✓ Rheumatoid arthritis
- ✓ Malabsorption syndromes
- ✓ Chronic liver disease
- ✓ Organ transplantation
- ✓ Chronic renal failure
- ✓ Prolonged immobilization

**Men at risk for osteoporosis :**

- ✓ Hypogonadism

**Measurement of Bone Mass :**

The non invasive techniques available for skeletal mass or BMD are

- a) Dual Energy X-ray Absorptiometry (DEXA)
- b) Single Energy X-ray Absorptiometry (SEXA)
- c) Conventional Radiographs only when BMD decreases by 30-50%
- d) Digital Radiogrammetry (DXR) Geometric measurement of bone dimensions on high resolution radiographs
- e) Quantitative Computerized Tomography (QCT)
- f) Quantitative Ultra Sound (QUS) is inexpensive and portable

g) MRI of the bones especially at the spine, forearm and tibia

DEXA is the current gold standard for measurement of BMD. However the results may be inaccurate in presence of osteomalacia, osteoarthritis, vascular calcification and previous fractures etc.

USFDA stated that hip is the preferred site of measurement of BMD because it predicts the fracture risk at a much greater frequency than any other bone.

### **Bio-chemical markers of bone turnover :**

These markers provide integrated assessment of global disease activity in contrast to DEXA which is regional and bone biopsy that is focal. The biochemical markers of bone formation or osteoblastosis are Bone Specific Alkaline Phosphatase (BSAP), Serum Osteocalcine, and Serum Propeptide of Type-1 Procollagen and those for bone resorption or osteoclastosis are serum and urine levels of cross linked telopeptide. However the emerging consensus is that DEXA may be used for initial diagnosis and urinary markers for assessing response to therapy. Urinary markers include pyridinium cross-links of collagen (pyridinoline, deoxy-pyridinoline) and C&N telopeptides of type I collagen. These markers are not yet freely available in India.

### **Routine Lab Investigations :**

Besides complete blood count, urine and serum calcium estimation, serum parathormone (PTH) assay are done in order to reach a diagnosis. Low urine calcium denotes less than 50 mg of calcium in urine in 24 hours and hypercalcuria refers to more than 300 mg calcium in 24 hours. Hypercalcuria occurs in haematological malignancies and conditions associated with excessive bone turnover. High serum calcium indicates hyper parathyroidism and malignancies related to bones. In the presence of hypercalcaemia, a serum PTH level differentiates between hyperparathyroidism (PTH high) and bone related malignancies (PTH low). In selected cases, investigations for endocrinal disorders such as Thyroid Stimulating Hormone (TSH) and urinary free cortisol assay should be measured. Malabsorption syndrome can be ruled out by estimation of serum calcium, protein, cholesterol etc. Myeloma shows punched out lesion on radiography and M band on electrophoresis.

### **Prevention of osteoporosis :**

Health education, public awareness, reducing steroid intake to the lowest possible dose, and awareness about bone health and etiology about fragility fractures are the cornerstones for the prevention of osteoporosis. Life style measures such as regular physical activity, weight bearing and endurance exercises are essential in addition to daily intake of 1 to 1.5g of calcium. Cessation of smoking and alcohol intake are essential. Calcium rich food items are milk, curd, cheese, beans and spinach etc. Intake of milk is not accepted by many because of its dairy odour, addition of milk to other food items such as rice, chapattis and bread etc. alleviates the odour. Though Hormone Replacement Therapy (HRT) has bone sparing effect, long term controlled trials have failed to substantiate such a benefit. Bisphosphonates have been demonstrated to be safe, effective non hormonal option for prevention of osteoporosis, as well as reduction of certain fractures especially vertebral.

Regular calcium supplementation is vital for preventing osteoporosis related fractures.

## CONSTIPATION IN ELDERLY :

Constipation is a very common complaint in clinical practice, in a Geriatric clinic a four year experience has shown the incidence to be 60-70% in elderly persons. It refers to persistent, difficult, infrequent, or seemingly incomplete defecation. Though normal bowel habits vary, a widely acceptable definition by the 'Rome criteria' is given as persistently difficult, infrequent defaecation, or the sensation of incomplete defaecation. The criteria required are two or more of the following for at least 3 months:

- ❖ Straining at defaecation at least a quarter of the time;
- ❖ Lumpy or hard stools at least a quarter of the time;
- ❖ The sensation of incomplete evacuation at least a quarter of the time;
- ❖ Two or fewer bowel movements per week.

Unlike irritable bowel syndrome, abdominal pain is not a prerequisite for the diagnosis. Stool frequency alone is not a sufficient criterion for the diagnosis of constipation because many constipated patients with a normal frequency of defecation complain of excessive straining. Other common complaints suggestive of constipation are hard stools, lower abdominal fullness and a sense of incomplete evacuation.

Stool form and consistency are well correlated with the time elapsed from the preceding defecation. Intestinal transit varies with the consistency of stool. Hard pellet like stools occur with slow transit whereas very rapid transit is observed with loose watery stools. Volume of stool material also contributes to the subjective sense of constipation, because small pellet like stools are more difficult to expel than large ones. Objective assessment of straining at stool is difficult and unpredictable in view of large person to person variation. Need for enemas, bowel wash and digital disimpaction is clinically useful to corroborate and quantify the patient's perception of difficult defecation. Poor sanitation facility and age related physical decline contribute greatly to the larger incidence of constipation in elderly population. Psychological factors are equally important. Depression, drugs especially antihypertensives, antidepressants and many others add to the increased incidence of constipation in the elderly. An elderly who is serious about daily bowel evacuation will be greatly concerned by missing a daily bowel moment. Some co-morbidities such as osteoarthritis of knees, general muscular weakness, poor visibility, non availability of good sanitation facility and over crowding are hindrances for the regular and daily bowel moment. The common causes of constipation are :

### *Types of constipation and causes*

### *Examples*

#### **Recent Onset**

Colonic obstruction

Neoplasm: stricture: ischemic, diverticular, inflammatory

Anal sphincter spasm, Medications

Anal fissure, painful hemorrhoids

**Chronic**

Irritable bowel syndrome, Medications	Constipation-predominant, alternating Ca <sup>2+</sup> blockers, antidepressants
Colonic pseudo-obstruction	Slow transit constipation, megacolon (rare Hirschsprung's, Chagas)
Disorders of rectal evacuation	Pelvic floor dysfunction, anismus, descending perineum syndrome, rectal mucosal-prolapse, rectocele
Endocrinopathies	Hypothyroidism, hypercalcemia, pregnancy
Psychiatric disorders	Depression, eating disorders, drugs
Neurologic disease	Parkinsonism, multiple sclerosis, spinal cord injury
Generalized muscle disease	Progressive systemic sclerosis

Constipation of any cause can be aggravated by chronic illnesses that lead to physical or mental impairment and result in inactivity of physical immobility. Constipation can be idiopathic or secondary. Idiopathic constipation does not have a demonstrable cause but radio imaging studies have shown that reduced frequency of propulsive colonic contractions result in delayed emptying of stool. However a subset of secondary constipation termed as outlet obstruction to defecation also called evacuation disorder is because of delayed colonic transit.

**Approach to the elderly patients with constipation :**

A thorough history from the patient as well as the caregiver is important. The exact quantification of symptomatology and the measures taken during last few days to get rid of the difficulties and discomfort are to be enumerated. Medications taken are to be thoroughly charted out. A thorough search for finding the cause must be made, including colonic motility studies. In more than 90% of cases a cause cannot be found out.

Grading of constipation as mild, moderate and severe or intractable are made to find out suitable and appropriate solutions, for example less than 5% of population of constipated elderly should be referred to Gastroenterologists or referral centers. Further observation of the patient may occasionally reveal a previously unrecognized cause such as an evacuation disorder, laxative abuse, malingering or psychiatric disorder, evaluation of physiological function of the colon and pelvic floor. Assessment of the psychological status and radio imaging studies help in the rational choice of treatment. Ample hydration, exercise and supplementation of dietary fiber more than 15-25 g per day are the mainstays of treatment of majority of the cases of idiopathic constipation. However more than 50% cases seek medical help.

**Investigations in a patient of severe constipation or those with mild to moderate cases who fail to respond to medicinal measures :**

They are broadly divided into two headings

i) Measurement of colonic transit, ii) anorectal and pelvic floor tests

i) Measurement of colonic transit is done by Radioscintigraphy with a delayed-release capsule containing radio labeled particles. It has been used to noninvasively characterize normal, accelerated or delayed colonic function over 24 to 48 hours with low radiation exposure. This approach simultaneously assesses gastric, small bowel and colonic transit. The disadvantages are the greater cost and the need for specific materials prepared in a nuclear medicine laboratory.

ii) Anorectal and pelvic floor tests are :

- ❖ Balloon expulsion test
- ❖ Anorectal manometry
- ❖ Defecography
- ❖ Dynamic imaging studies such as proctography during defecation
- ❖ Neurologic testing such as electromyography or EMG
- ❖ Ultrasonography etc.

### **Treatment :**

Only 30% of patients with severe constipation do have a physiological cause whereas remaining 70% need medical treatment, rarely surgical and very rarely both modes of treatment. Patients with Slow Transit Constipation (STC) require laxatives. But some cases of STC without evidences of obstructed defecation, colectomy and ileorectostomy are indicated. In very mild cases dietary fiber deficiency may be relevant; however, in the more severely affected patients fiber supplementation may aggravate the symptoms. In some severely affected women there is a relation between symptom severity and luteal phase of menstrual cycle suggesting a sex hormonal aetiology, progesterone supplementation is effective in such cases.

Purgatives are substances that hasten the transit of faecal matter in the intestine, they include laxatives, faecal softeners and stimulant purgatives. The laxatives are bulk laxatives such as methyl cellulose and the plant gums for example sterculia, agar, bran and ispaghula husk and osmotic laxatives such as saline purgatives, lactulose and insoluble salts such as magnesium sulphate and magnesium hydroxide. The fecal softener is docusate sodium. The stimulant purgatives are bisacodyl, sodium pico sulphate and senna.

### **ASTHMA IN ELDERLY :**

Asthma is defined as a chronic inflammatory disease of the airways characterized by a state of hyper responsiveness of the tracheo bronchial tree in response to a multiplicity of stimuli. It is physiologically manifested by a widespread narrowing of the air passages that can be relieved spontaneously or as a result of therapy and clinically manifested in the form of paroxysms of dyspnoea, cough and wheezing.

The disease is universally prevalent and can occur at any age and is an important cause of respiratory morbidity and mortality. The incidence is steadily increasing more so in the last thirty years. This

might be because of increased environmental pollution etc. It is estimated that asthma is prevalent in early life so much so that around half of the cases occur before the age of 10 and another third before the age of 40. In view of advancement of medical science in the past 15 years especially early diagnosis and better therapeutic intervention, more number of cases of elderly with asthma are being encountered in clinical practice nowadays. So much so that around half of the cases belong to the age group of 50 or beyond. Reactivation of childhood asthma, occupational exposure and more over increase in life expectancy in recent decades awarded to the increased incidence of elderly with asthma.

Environmental and air pollution are usually related to climatic conditions that promote the concentration of atmospheric pollutants and allergens, more so in industrial and densely populated urban areas. The air pollutants are ozone, nitrogen dioxide, sulphur dioxide etc. Increase in incidence of overweight population in the society has been linked with increased incidence of asthma, the probable explanations are gastro esophageal reflux, hormonal and sedentary lifestyle etc.

Occupational factors play a great role in initiating and aggravating asthmatic attacks in persons exposed to industrial products, they are metal salts such as platinum, chrome and nickel, wood and vegetable dusts, pharmaceutical agents, industrial plastics and chemicals, biological enzymes.

Infections are the most common of the stimuli that evoke acute exacerbation of an asthmatic attack, the most common microbes being respiratory viruses, that initiate the inflammatory process through T cell derived cytokines, that potentiate the infiltration of inflammatory cells into already susceptible airways. Similarly exercise produces obstruction of the airways related to a thermally produced hyperemia and engorgement of the microvasculature of the bronchial wall. Emotional stresses of adult and elderly life aggravating an attack of asthma are probably related to vagus and endorphins. The genetic factors such as genetic linkage to high serum IgE levels and atopy has been observed on chromosomes 5q, 11q and 12q, however genetic considerations have little role to play in the etiology of the asthma in the elderly.

### **Pathogenesis :**

Non-specific hyperirritability of tracheobronchial tree is related to viral infection, oxidant air pollutants etc. as a result of interaction among the residents and the infiltrating inflammatory cells in the airway surface epithelium. The cells thought to play the inflammatory role are mast cells, eosinophils, lymphocytes, epithelioid cells, neutrophils and macrophages. The mediators released are histamines, bradykinins, the leukotrienes C, D & E, platelet activating factor and prostaglandins  $E_2$ ,  $F_2 \alpha$  and  $D_2$ .

### **Pathophysiology :**

The pathophysiological hallmark is reduction in airway diameter brought about by contraction of smooth muscle, vascular congestion, oedema of the bronchial wall and obstruction by thick and tenacious secretion. The acute episodes are brought about by exposure to specific irritants such as cold air, inorganic dust, cigarette smoke, perfumes, paint etc. Airway obstruction can be episodic and transient or more persistent resulting in progressive epithelial damage and obstruction. The

net result of such pathophysiological changes is an increase in airway resistance, a decrease in forced expiratory volumes (FEV) and flow rates, hyperinflation of the lungs and thorax, increased work of breathing, alterations in respiratory muscle function, changes in elastic recoil, mismatched ventilation and perfusion ratios and altered arterial blood gas concentrations. Later on there is evidence of right ventricular hypertrophy and pulmonary hypertension. By the time the patient is symptomatic and needing treatment, the vital capacity tends to be 50% or less of normal and FEV<sub>1</sub> averages 30% or less and residual volume frequently approaches 400%. Hypoxia is the universal finding during this phase. If there is hypercapnia, the patient lands in respiratory failure and all such cases should be managed for metabolic acidosis and cyanosis. Alveolar hypoventilation sometimes may need artificial ventilated support.

### **Clinical features :**

The symptom triad of cough, dyspnea and wheezing (last often being regarded as the sine qua non) is characteristic of asthma, however some asthmatics never wheeze, some others describe only cough. Asthmatic wheezing is polyphonic, the symptom of a sensation of tightness of chest must be distinguished from angina pectoris and esophageal spasm. Cough is a predominant symptom in childhood asthma having thick stringy mucus, rarely liquid and frothy. There could be presence of casts of the distal airways (Curschmann's spirals) containing eosinophils and Charcot Leydon crystals. When mucus plugging of the airways is severe, there could be gasping. Atelectasis adds to the misery of difficult breathing and progressively downhill course of respiratory functional decline. Spontaneous pneumothorax and/or pneumomediastinum is a rare complication.

The patient could have tachycardia, tachypnoea and mild systolic hypertension. Paradoxical pulse rarely occurs because of grossly negative intrathoracic pressure.

During asymptomatic phase, the patient may not have any positive respiratory finding, a bronchoprovocation test may be needed to reach a diagnosis.

In the elderly, in view of associated features of chronic bronchitis (COPD) coexisting (Dutch hypothesis), it is often difficult to decide to what extent the symptoms and signs are because of asthma, however hyperinflation of lung fields, frequent lower respiratory tract infection and frequent coexistence of respiratory failure point to an associated COPD. Ten percent of the COPD patients do have asthma, some time termed as wheezy bronchitis, the administration of steroid has to be more liberal in such patients. Though COPD may aggravate with pollutant exposure, indoor air pollution especially from burning fuels is more a causative factor than air pollution and other external allergens, the reverse is true for etiology of asthma. Cough with copious sputum production is the hallmark of diagnosis of COPD, whereas sputum production is not a feature of asthma. Long term use of steroid is not recommended in COPD whereas a good number of cases of asthma are highly dependant on chronic user steroids.

### **Treatment :**

Steroids are the most potent and most effective anti-inflammatory medications available. Systemic or oral steroids are most beneficial in acute illness when severe airway obstruction is not resolving or is worsening despite intense optimal bronchodilator therapy, and in chronic disease when there

has been failure of a previously optimal regimen with frequent recurrences of symptoms of increasing severity.

### **Aims and objectives of management of asthma :**

- ❖ Achieve and maintain control of symptoms
- ❖ Prevent asthma exacerbations
- ❖ Maintain pulmonary function as close to normal as possible
- ❖ Avoid adverse effects from asthma medications
- ❖ Prevent development of irreversible airflow limitation
- ❖ Prevent asthma mortality

### **Step-care approach in the management of asthma :**

#### *Step-up drug treatment :*

- i) Occasional use of inhaled short-acting  $\beta_2$ -adrenoceptor agonists
- ii) Low-dose inhaled corticosteroids (or other anti-inflammatory agents)
- iii) Low-to moderate-dose inhaled corticosteroids plus long-acting inhaled  $\beta_2$ -adrenoceptor agonist or leukotriene receptor antagonist
- iv) High-dose inhaled corticosteroids and regular bronchodilators
- v) Addition of regular oral corticosteroid therapy

#### *Start high and step down :*

- a) Occasional temporary step-ups will be needed to control exacerbations
- b) Consider step-down if good symptom control for 3 or more months
- c) Only think of withdrawing anti-inflammatory treatment if patient well for at least 6 months

### **Exacerbations of asthma :**

Asthma can have exacerbations characterized by increased symptoms, deterioration in PEF and an increase in airway inflammation. Exacerbations may be precipitated by infections (most commonly viral), moulds (*Alternaria* and *Cladosporium*) and on occasion pollen (particularly following thunderstorms). Increase in air pollution is accompanied by increased hospital admissions. Most attacks are characterized by a gradual deterioration over several hours to days but some appear to occur with little or no warning: so-called brittle asthma.

### **Immediate assessment of acute severe asthma :**

#### **Acute severe asthma :**

- PEF 33-50% predicted (<200 l/min)
- Respiratory rate  $\geq$  25/min
- Heart rate  $\geq$  110/min

- Inability to complete sentences in 1 breath

### **Life-threatening asthma :**

- PEF 33-50% predicted (< 100 l/min)
- SpO<sub>2</sub> < 92% or PaO<sub>2</sub> < 8 kPa (60 mmHg) (especially if being treated with oxygen)
- Normal PaCO<sub>2</sub>
- Silent chest
- Cyanosis
- Feeble respiratory effort
- Bradycardia or arrhythmias
- Hypotension
- Exhaustion
- Confusion
- Coma

### **Near-fatal asthma**

- Raised PaCO<sub>2</sub> and/or requiring mechanical ventilation with raised inflation pressures

### **Management of acute severe asthma on discharge :**

If patients fail to improve, a number of further options may be considered. Intravenous magnesium may provide additional bronchodilation in patients whose presenting PEF is < 30% of predicted. Some patients appear to benefit from the use of intravenous aminophylline but careful monitoring is required. Intravenous leukotriene receptor antagonists may soon become available.

### **Monitoring of treatment :**

PEF should be recorded every 15-30 minutes and then every 4-6 hours. Pulse oximetry should ensure that SaO<sub>2</sub> remains > 92% but repeat arterial blood gases are necessary if the initial PaCO<sub>2</sub> measurements were normal or raised, the PaO<sub>2</sub> was < 8 kPa (60 mmHg), or the patient deteriorates.

### **Indications for assisted ventilation in acute severe asthma :**

- Coma
- Respiratory arrest
- Deterioration of arterial blood gas tensions despite optimal therapy
  - PaO<sub>2</sub> < 8 kPa (60 mmHg) and falling
  - PaCO<sub>2</sub> > 6 kPa (45 mmHg) and rising
  - pH low and falling (H<sup>+</sup> high and rising)
- Exhaustion, confusion, drowsiness

**Prognosis :**

The outcome from acute severe asthma is generally good. Death from asthma is fortunately rare but a considerable number of deaths occur in young people and many are preventable. Failure to recognize the severity of an attack, on the part of either the assessing physician or the patient, contribute to under-treatment and delay in delivering appropriate therapy.

Prior to discharge, patients should be stable on discharge medication (nebulised therapy should have been discontinued for at least 24 hours) and the PEF should have reached 75% of predicted or personal best. The acute attack provides an opportunity to look for and address any trigger factors, for the delivery of asthma education and the provision of a written self-management plan. The patient should be offered an appointment with a GP or asthma nurse within 2 working days of discharge and follow-up at a specialist hospital clinic within a month.

**DIABETES MELLITUS IN ELDERLY :**

Approximately 13% of adults older than 70 years have diabetes mellitus, and 11% of adults between age 60 and 74 remain undiagnosed. Higher rates of premature death, functional disability, and chronic illnesses, such as hypertension, cerebrovascular accidents, and coronary artery disease, often affect elderly diabetic patients. In individuals less than 80 years of age, diabetes occurs more frequently in men than in women. Interestingly, this gender predisposition is reversed in individuals >80 years of age. It is hypothesized that this is related to selective mortality in men. Although the majority of elderly adults with diabetes have type 2 diabetes, it is important to recognize that 10% of people more than 70 years of age who develop diabetes will have type 1 diabetes.

The complex interaction of multiple diseases and prescription of a multitude of medications can result in modification of presenting symptoms and not uncommonly cause iatrogenic disorders. These may result from polypharmacy or age-related changes in drug distribution and metabolism. Thus these patients present not only a significant economic burden on health services but also a difficult and challenging management problem, partly because of their age and partly due to the frequency of social and other medical problems, including long-term complications of their diabetes.

**Pathogenesis :**

Factors that predispose the elderly to the development of type 2 diabetes are :

- Advanced age
- Family history of type 2 diabetes
- Race (African, American, Hispanic, Native American)
- Lifestyle
  - \* Obesity with central fat distribution
  - \* Physical inactivity
  - \* Diet high in fat and sugar and low in complex carbohydrates.
  - \* Drug therapy (diuretics, corticosteroids, etc.)

➤ Metabolic alterations

- \* Impaired insulin release (lean)
- \* Insulin resistance (obese)

As in their younger counterparts, elderly individuals have a strong genetic predisposition for the development of type 2 diabetes. Lifestyle factors and drug therapy may contribute to diabetes in the elderly. Metabolic abnormalities also contribute to glucose intolerance.

Metabolic abnormalities present in type 2 diabetes may develop due to defects in hepatic glucose production, postprandial first- phase and second-phase pancreatic insulin secretion, and insulin utilization in the tissues (insulin resistance). Comparative studies have evaluated which of these metabolic alterations contribute to the development of diabetes in lean and obese elderly. Hepatic glucose production was not found to be impaired in lean or obese elderly diabetics. First-phase insulin release was impaired in lean and obese elderly, however; second-phase insulin release was found to be decreased only in lean elderly diabetics. Insulin resistance was profound in obese elderly but minimal in lean elderly diabetics. Information from these studies suggests that the primary metabolic abnormality in lean elderly diabetics is impairment of pancreatic insulin release, whereas the primary abnormality in obese elderly diabetics is insulin resistance. This information aids the practitioner in selecting the most appropriate antidiabetic agent based on body weight.

**Clinical Features :**

Unlike in younger individuals, diabetes in the elderly is often asymptomatic at onset. Polyuria is less common in the elderly because the renal threshold for glucose increases with age. Polydipsia is infrequent because the thirst mechanism is impaired in the elderly. Symptoms that may be present in the elderly are usually nonspecific such as weight loss, fatigue, confusion and urinary incontinence and may be confused with other co morbid conditions. In elderly patients, diabetes mellitus increases the risk for development or worsening of many common geriatric syndromes. The AGS panel focused on 6 of these syndromes : chronic pain, injurious falls, polypharmacy, cognitive impairment, urinary incontinence and depression. Diabetes in the elderly is often diagnosed as part of another illness, such as acute myocardial infarction or hyperglycemic hyperosmolar nonketotic syndrome (HHNS). Hyperglycemic hyperosmolar nonketotic syndrome is a life-threatening emergency seen in the elderly type 2 diabetics. The hallmark features of HHNS include severe hyperglycemia, profound dehydration, absence of ketoacidosis and neurological signs of depressed sensorium or coma. Up to two-third of all cases of HHNS occur in patients with no prior history of diabetes.

**Complications of Diabetes in the Elderly :**

**Acute**

**Osmotic diuresis**

- \* Dehydration
- \* Hypotension
- \* Fluid and electrolyte loss
- \* Impaired cognition

**Chronic**

**Macro vascular**

- \* Cardiovascular disease
- \* Cerebrovascular disease
- \* Peripheral vascular disease

**Infection****Weight loss**

- \* Muscle loss
- \* Loss of strength and mobility

**Micro vascular**

- \* Retinopathy
- \* Nephropathy
- \* Peripheral and autonomic neuropathy

**Hyperosmolar hyperglycemia nonketotic syndrome :**

The elderly diabetic is prone to the same chronic micro vascular and macro vascular complications as younger individuals, yet the prevalence of complications increases with age. Cardiovascular disease is the primary cause of death in 70% of these patients. Microalbuminuria and proteinuria are associated with increased cardiovascular mortality. Many elderly individuals with type 2 diabetes have been diabetic for many years prior to diagnosis or have had impaired fasting glucose (IFG), both of which contribute to cardiovascular mortality.

Impaired cognitive function is an acute and chronic problem of the elderly diabetic. Studies have found that elderly diabetics have decreased cognitive function compared to nondiabetic elderly. The changes that occur in cognitive function are directly related to glycosylated hemoglobin (HbA1c) levels. Other studies have found that improved glycemic control as measured by HbA1c is associated with improvements in measures of affect, attention, concentration, conceptual thinking and memory.

**Treatment :**

Despite the increased risk of hypoglycemia, treatment of type 2 diabetes in the elderly is warranted to prevent the acute and chronic complications of the disease. Defining glycemic goals in the elderly diabetic is a balancing act between preventing hypoglycemia, the symptoms of hyperglycemia and the development of chronic complications. The achievement of euglycemia is often not possible in the elderly. The ADA does not identify specific glycemic goals for the elderly; however, some practitioners recommend a fasting plasma glucose between 120-150 mg/dl, postprandial glucose 150-200 mg/dl and a HbA1c 1% above the upper limit of normal. It is highly recommended that the elderly perform self-monitoring of blood glucose (SMBG), although the frequency of SMBG in the elderly has not been specified by the ADA. Controversy exists in deciding how aggressively to treat the elderly diabetic because of the potential side effect of hypoglycemia. Hypoglycemia in the elderly is associated with an increased risk of stroke, myocardial infarction and seizures. The elderly exhibit an impaired response of glucose counter regulatory hormones in the presence of decreased glucose. The autonomic warning signs of hypoglycemia such as sweating and palpitations are also impaired in the elderly.

Diet and weight loss is considered the treatment of choice in the elderly diabetic. Dietary challenges in the elderly include the presence of ill-fitting dentures, difficulty in chewing and swallowing, decreased ability and interest in cooking, age-related changes in taste perception, reluctance to change, long-established eating habits, physical and functional limitations.

Caloric restriction should be considered in obese patients. Caloric restriction is not recommended in patients over 70 years of age who are less than 20% above their ideal body weight. Moderate

weight loss in the elderly diabetic is associated with improved glycemic control. Carbohydrate, fat and protein requirements should be based on individual needs. A comprehensive nutritional assessment by a registered dietician is recommended in all elderly diabetics. The antioxidants vitamins C and E help to offset age-related increases in free radicals and may improve metabolic control. Elderly are often deficient in magnesium, and magnesium supplementation has been shown to improve glucose control in the elderly by increasing glucose-induced insulin release and improving insulin utilization. Zinc may have a role in improving wound healing in the diabetic; however, controlled studies are lacking. Chromium, a micronutrient, has been shown to improve insulin utilization in individuals with chromium deficiency.

The benefits of exercise are numerous including improvements in glucose tolerance, blood pressure, weight, lipid indices, cardiac status and insulin utilization. Limitations to exercise in the elderly diabetic include cardiovascular disease, arthritis and peripheral neuropathy.

### **Pharmacotherapy :**

Sulfonylureas are a good therapeutic choice in the lean elderly. They may cause weight gain, which should be considered prior to initiating therapy in the obese patient. Metformin, a biguanide, decreases hepatic glucose production and improves insulin utilization, other benefits of metformin include no associated weight gain, beneficial lipid profile effect and no hypoglycemia. In renal impairment, metformin may cause lactate accumulation and lactic acidosis-which has a 50% mortality rate. The alpha-glucosidase inhibitors, acarbose and miglitol decrease the gastrointestinal absorption of carbohydrates, do not cause hypoglycemia as monotherapy and are associated with a smaller reduction in HbA1c compared to the other agents. The Thiazolidinediones, rosiglitazone and pioglitazone improve insulin utilization and decrease hepatic glucose production. They may cause weight gain. Repaglinide is from the meglitinide class and increases insulin release from the pancreas in a glucose dependent fashion. The incidence of hypoglycemia with repaglinide is less and is a reasonable alternative to the sulfonylureas in the brittle elderly diabetic who is very prone to hypoglycemia. Combination oral therapy may be considered when glycemia control is not achieved with monotherapy. Oral combination regimens that are FDA approved for the treatment of type 2 diabetes are summarized in algorithm. Insulin alone or in combination with oral agents may be utilized in individuals who are unable to achieve glycemic control with oral agents. Insulin can be used safely in the elderly without severe episodes of hypoglycemia and with no negative effect on lifestyle. More intensive regimens are associated with improvement in glycemic control and decreased complications.

### **Footcare in elderly diabetics :**

One of the most dreaded complications of diabetes is foot gangrene. This complication has been recognized from ancient times. Both ancient Indian as well as Western medical literature have numerous references to this complication. The incidence of foot problems like foot ulcers/deformities in diabetics is about 15%. This means of the total number of diabetic patients 15% will get foot ulcers/ deformities. If these patients are not advised properly and if they do not take care of their feet then they are likely to lose their feet/legs due to gangrene. Therefore if there is no effective preventive strategy then by 2015 as many of the 6 crore patients are likely to lose their

limbs in the prime of their life. This will be a huge economic loss to the society. It is always better to prevent the diabetic foot wounds than to treat it. The Indian as well as International statistics show that 60% in-patient admissions for the diabetic patients, are for foot problems. Every inpatient admission in the hospital costs a patient on an average Rs. 25 to 30 thousand. Therefore preventive care is very important and essential.

#### **Ten commandments of diabetic foot care :**

1. Do not walk barefoot.
2. Inspect the feet daily for blisters, wounds, bleeding, smell, increased temperature at pressure points of feet.
3. Do not apply hot fomentation/ cold compresses/ electric heating pads/ strong counter irritant ointments to legs & feet.
4. Use correct footwear. Choose your footwear after consulting your doctor. Always wear footwear with socks with loose elastic.
5. Do not walk bearing weight on an affected / ulcerated foot or after surgery.
6. Do not sit cross-legged for long time.
7. Do not remove foot wear during travel and place your feet on any hot surface. This can cause burns.
8. Cut the nails regularly, trimmed square.
9. Do not cut corns/ calluses with a blade or a knife. Home surgery is dangerous.
10. Clean the feet twice a day with soap and water. Wipe the web spaces dry and apply softening agent to feet.

#### **Cognitive dysfunction in diabetes mellitus :**

Cognitive dysfunction in elderly diabetics could be :

- i) Related to age
- ii) Related to diabetes mellitus
- iii) Secondary to a known neurological disorder
- iv) Secondary to a known psychiatric disorder
- v) Symptom of mild neurocognitive disorder or dementia

Diabetes mellitus increases the risk of dementia, and vascular dementia (VaD) in particular, in very old people. The risk for dementia and VaD is especially high when diabetes mellitus occurs together with severe systolic hypertension or heart disease. The strongest predictors of both cognitive decline and mortality are age, APOE4, manifest vascular diseases and diabetes. A Scandinavian study showed that four diagnoses were negatively associated with cognition, namely congestive

heart failure, stroke, coronary heart disease, and diabetes mellitus, with a joint effect of 0.47 standard deviations. The impact of disease status was largest on perceptual speed and fluency, memory was impacted only by diabetes, and knowledge was not related to any somatic diagnosis. Epidemiological evidence also suggests that diabetes mellitus significantly increases risk for the development of Alzheimer's disease, independent of vascular risk factors. The role of insulin as a neuromodulator in the brain has been described and its significance for AD has also emerged. Insulin dysregulation may contribute to AD pathology through several mechanisms including decreased cortical glucose utilization particularly in the hippocampus and entorhinal cortex; increased oxidative stress through the formation of advanced glycation end-products; increased Tau phosphorylation and neurofibrillary tangle formation; increased beta amyloid aggregation through inhibition of insulin-degrading enzyme. Type 2 diabetes is associated with hippocampal and amygdalar atrophy, regardless of vascular pathology. This could suggest that Type 2 diabetes directly influences the development of Alzheimer neuropathology. Taken together, the data available suggest that diabetes is probably a risk factor for Alzheimer's disease mainly through the cerebrovascular disease diabetes causes. In people with other risk factors such as ApoE4 allele, diabetes appears to lead to a more dramatic increase in Alzheimer's disease pathology. Dementia is treated with acetylcholinesterase inhibitors or memantine.

### **Diabetes and Geriatric Syndromes :**

Older patients with diabetes are at a greater risk for several geriatric syndromes. Six of those geriatric syndromes are selected by the American Geriatrics Society for inclusion in the diabetes mellitus management guidelines. They are :

- ❖ Polypharmacy
- ❖ Depression
- ❖ Cognitive impairment
- ❖ Pain
- ❖ Injurious falls
- ❖ Urinary incontinence

Evidence from well conducted randomized control trials on screening and recommendations in this group is lacking. The present recommendations are based on expert opinion.

### **Special problems in the elderly :**

Diabetes in the elderly may pose special problems in management. Elderly individuals may be those who have had the onset of the disease at a relatively younger age, when diabetes education was easily assimilated, or those in whom it may have developed late. In either case, adhering to the management principles of diabetes may be difficult in this particular group.

Diagnosis of diabetes in the elderly is often incidental, being detected as part of a routine work-up for some surgery or procedure. In any case, the onset is so insidious that diagnosis is delayed, unless the patient has come to hospital in an acute emergency such as myocardial infarction or stroke.

Dementia and cognitive impairment may be an impediment in diabetes education. Memory impairment might be especially dangerous. Patients may take the anti-diabetic medication and forget to eat, or may forget the drug and proceed to eat. This could lead to life-threatening hypoglycemia or intractable hyperglycemia respectively.

Visual impairment due to cataract or retinopathy causes considerable difficulty, especially for elderly patients who are on insulin and want to inject themselves. Hearing impairment precludes the use of group sessions for these individuals. Neuropathy or degenerative spine problems may not allow them to exercise. Due to autonomic neuropathy of old age or diabetes they may not experience the warning signals of hypoglycemia, which may be particularly dangerous.

Social issues such as having to stay alone and taking care of themselves pose many problems both to the patient and the treating physician. This often leads to depression due to which these patients are not receptive to education sessions.

### **Diabetes education in the elderly :**

It is best to ensure that the care giver, if any, for the elderly diabetic is present for the education sessions. If not, extra time must be allotted to the education of such a patient, as he may be depressed or hearing impaired. More visual aids should be used in the elderly, especially if they are hearing impaired. The targets for glycemia may have to be modified depending upon whether the patient lives alone, is able to recognize hypoglycemia signs and whether he can afford expensive treatment.

The focus in the elderly need not be entirely on tight glycaemic control, since long-term complications is not the issue in this age group. Rather, the focus ought to be on maintenance of general well being and improved quality of life. Diabetes self-care is especially important. Lifestyle modification and dietary advice is basically similar to that given to middle-aged subjects.

### **Conclusion :**

The prevalence of type 2 diabetes increases with age and is associated with causing significant morbidity and mortality in the elderly. The severity of complications is greater in the elderly, as are the potential risks associated with treatment. Treatment of diabetes in the elderly must be aggressive enough to prevent the acute and chronic complications of hyperglycemia while avoiding the equally dangerous hypoglycemia. The Alpha Glucosidase Inhibitors (AGI) and the Pseudo Alpha Glucosidase Inhibitors such as : Acarbose, Miglitol and Voglibose etc. are safe in the elderly in view of their anti-hyperglycemic than hypoglycemic effect. They are effective against post prandial surges of hyperglycemia and equally safe on long term use. However, future must see still better drugs for the over growing number of elderly diabetics.

### **HYPERTENSION IN ELDERLY :**

Hypertension is very common in elderly. The Systolic Blood Pressure (SBP) tends to rise progressively with age, whereas the Diastolic Blood Pressure (DBP) tends to have a plateau before the age of 60 and drops thereafter. Therefore Isolated Systolic Hypertension (ISH), SBP more 160mm of Hg and DBP less than 90mm Hg is common in the elderly. In a recent meta analysis,

prevalence of ISH rises from 5% at the age of 60 to 12.6% at 70 and 23.6% at the age of 80 years. The Framingham study concluded that SBP elevation was more determinant of risk for both stroke and coronary syndromes than DBP. Similar studies by Langer et. al. revealed that the direct burden on the heart and the vasculature were more with elevated SBP than DBP. The MRFIT trial had the same conclusion.

With the increase in the life span, the recent demographic transition points towards increase in the elderly population. In view of the Age Related Physical Declines (ARPDs) affecting almost all organs of the human body and increased number of co-morbidities, treating elderly hypertensives offers substantial challenges to the physicians. In case of elderly hypertensives, individualization of therapy is greatly warranted.

Several studies have shown that healthy elderly hypertensives treated with relatively modest doses of antihypertensives show a substantial reduction of cardiocerebrovascular morbidities and mortalities.

### **Prevalence :**

In India the prevalence of hypertension is about five to six percent in all age groups beyond the age of 18 years. Various studies have revealed that the incidence of hypertension is 8-11% in persons beyond 60. ISH is 2-3 times more common than essential hypertension. A recent meta analysis published about 3 years back documented that in diverse industrialized population the prevalence of ISH rose from 5-7% at 60 to 25% around the age of 80 years.

The incidence of White Coat Hypertension is as common as in young anxious people. Therefore few out-of-the-office readings are to be obtained to assess the actual status of blood pressure. Pseudohypertension because of arteriosclerotic and calcified arteries showing a greater SBP reading is common in elderly.

The National Health and Nutrition Examination Surveys (NHANES) have revealed that 20% of the entire U.S. population do have hypertension at any point of time, incidence increasing with age.

### **Risks :**

At all ages, systolic pressures are better predictors of cardiovascular risk than are diastolic pressures. Those with ISH have more coronary disease and strokes, with an approximate 1% increase in the rate of mortality from all causes for each 1 mm rise in the systolic pressure. Data from multiple population studies in India and abroad are remarkably consistent : ISH is associated with increased mortality.

A possible exception to the progressive risks of every increment in systolic pressure has been claimed for the very old people beyond 85 years of age. However in view of increased cardiocerebrovascular mortalities and morbidities from other causes, risks may remain the same. Total mortality, both from coronary disease and from stroke, is much higher in the elderly age groups than in the middle aged populations.

The risks are more in the elderly with co-morbidities and unstable cardiovascular status. The drug and dose related adverse reactions are likely to be much more common.

### **Pathophysiology :**

The basic mechanism for the progressive rise in SBP is the loss of distensibility and elasticity in the large capacitance arteries, a process that was nicely demonstrated over 50 years ago. Increasing volumes of saline were infused into the tied-off aortas taken from patients at death whose ages ranged from the 20s to the 70s. The pressure within the aortas from the elderly subjects rose much higher with very small increases in volume compared to younger subjects, reflecting the rigidity of the vessels.

Hemodynamically, ISH is characterized by a decreased compliance of the large arteries, high peripheral resistance, abnormal diastolic filling, well preserved to increased systolic function, and increased Left Ventricular mass. Cardiac output and blood volume may be diminished. The decreased volume, combined with the run-off from the smaller reservoir provided by the rigid large arteries, lowers diastolic pressure and further widens the pulse pressure. Elderly patients with combined diastolic and systolic hypertension, compared to the younger hypertensives have lower cardiac output, intravascular volume, renal blood flow and plasma rennin activity. They have higher peripheral vascular resistance, left ventricular wall thickness and mass. If a broad rise in both systolic and diastolic pressure is noted in an elderly patient, atherosclerotic renovascular disease should be suspected. Less commonly, showers of cholesterol emboli in the kidneys from an aortic aneurysm give rise to hypertension.

Complications among elderly hypertensives are fatal and non fatal coronary artery disease, congestive heart failure, cerebrovascular disease and progression to hypertensive emergency.

### **Treatment :**

There are two types of modalities available for the treatment of hypertension in the elderly, they are :

- A) Non-pharmacological therapy or Lifestyle modification
- B) Pharmacological therapy or Drug treatment

Lifestyle modification should be enthusiastically provided and vigorously pursued, preferably few weeks before, instead of drug therapy and along with drug therapy. A lot of trials and enough data are available to document the efficacy of such measures. This mode of therapy can be provided with minimal cost and could be utilized as primary prevention for those at risk, secondary prevention in elderly hypertensives along with drug treatment and serves as a part and parcel of the tertiary care. Lifestyle modification involves following procedures :

#### **1) Weight reduction :**

Special emphasis should be given in reducing weight in those weighing 10% or more than the ideal body weight. Weight reduction not only brings down blood pressure but also reduces the need of anti hypertensive therapy.

## **2) Alcohol consumption :**

Alcohol consumption should be reduced. Alcohol potentiates the action of catecholamines and may exacerbate hypertension in susceptible individuals. It is better to stop the alcohol consumption totally or limit the consumption to 1 oz. per day or less.

## **3) Dietary Management :**

### **a) Sodium Restriction**

Sodium restriction helps in volume contraction and thereby reduces the blood pressure. The efficacy of sodium restriction to lower the blood pressure has been well documented. There are two thoughts in advising sodium restriction. Some clinicians prefer to advise drastic curtailment of sodium intake while some prefer to restrict the sodium intake moderately. The reason for the second thought appears to be because the blood pressure in many patients is not sensitive to sodium levels. There is evidence to suggest that mild sodium restriction improves the efficacy of nearly all antihypertensive medications. Our observation is that, limitation of sodium intake to less than 2 gm per day (sodium chloride < 5gm/day) has been shown to reduce the blood pressure significantly in susceptible patients.

**b) Restriction of intake of cholesterol and saturated fats** to stabilize lipid profile and facilitate weight loss.

**c) Caloric restriction** for overweight patients and potassium supplementation for all hypertensives specifically for those having hypokalaemia.

**4) Regular Exercise** is advised for those having healthy cardiac status. Aerobic exercises such as brisk walking, running and swimming for those who are found clinically fit, help in reducing blood pressure. Everybody should have regular exercise, many trials have shown that SBP reduction up to 10mm of Hg has been found with few weeks of regular exercise. At least 10-20 minutes of brisk walking or 30-40 minutes of light walking has been advocated for elderly hypertensives. Every body at old age should undergo cardiac stress test prior to subjecting them for exercise.

## **5) Stress relief measures**

Relaxation techniques such as holidaying, listening to music, gardening, playing, chitchatting, sharing jokes etc. are very helpful adjunct to the management of hypertension in the elderly.

## **B) Pharmacological therapy or Drug treatment :**

Indications of initiating drug therapy - a) Mean of few BP recordings are essential not only to confirm hypertension but also to plan for dosage and number of anti hypertensives b) Failure of few weeks of non-pharmacological measures c) Evidence of target organ damage d) severe hypertension

First-line therapy for uncomplicated mild hypertensives should be low doses of a diuretic preferably potassium sparing such as 12.5mg of Hydrochlorothiazide. Recently safer diuretics such as metolazone and torsemide are available.

For those with ISH, Calcium Channel Blockers such as amlodipine, lercadipine, felodipine etc. are preferred drugs, first line in those who are having contra-indications for the use of diuretics or as adjunct to the diuretics when ever required.

Beta Blockers such as Nebivolol, Carvedilol and Metoprolol are preferred in elderly hypertensives having angina or in the setting of Coronary Artery Disease (CAD).

ACE-inhibitors and Angiotensin Receptor Blockers are used in those elderly hypertensives having diabetes mellitus, heart failure and chronic lung ailments.

The number of medicines should be as minimum as possible, single pill concept is always preferred over polypill concept.

The idea of “Start low and go slow” should be strictly adhered to.

### **Conclusion :**

Hypertension, is a disorder which needs regular observation of the patient especially in the elderly. Patient education is very important. Selection of drugs is the main challenge for the doctor. A patient must be assessed thoroughly so as to give him the maximum benefit of the drug available. Cost of the drug is important in continuing the patient treatment. Before prescribing any drug, pros and cons of drug should carefully be weighed. If a cheaper drug is equally suitable and advisable for the patient, clinician should not be fascinated by costlier, newer preparations. Costlier medicines must nevertheless be prescribed if the situation demands. It is this disorder, where the clinician has a major role in prevention of complications by imparting continuous education to the patient and selecting the best drug by assessing the cost-benefit analysis.

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