Introduction
Chapter-I

INTRODUCTION

What is meant by ‘old’? Chronological age cannot be used to define physical and mental abilities. The human being is the product of his genetic heritage as well as his past and present environment, including the injuries, infections, stresses, fatigues, nutritional imbalances and emotional trauma associated with them. It therefore stands to reason that the longer a person lives the more complex he becomes and that the physical and physiologic variations found in 70 years old persons, each of whom have been subjected to widely different environments make them a very heterogenous group. Old age should be regarded as a normal inevitable biological phenomenon. Ageing is a universal process.

Upon reaching age 65, men can expect to live about 14 years longer and women 18 years. For every 100 men over 65 years there are 146 women. There are five times as many widows as there are widowers. One third of older women live alone, but most men over 65 years are living with their wives. Thus the problems of aging are much more acute for women, since they live longer, more frequently live alone and are isolated and have lower incomes.

Low income and lack of education are more characteristic of blacks. Although most older persons are healthy, the average per capita expenditure for health care for the over 65 years group is about three times as high as that for the 19 to 64 years group. Although persons over 65 years account for about 11 per cent of the population, they utilize about one third of the nation’s hospital beds.
The old age is best defined as the age of retirement 60+ but nutritionally a person becomes old from 39+ onwards.

Stereotypes and realities

Some unfortunate stereotypes about older persons exist in all segments of our society: that they are set in their ways, lonely, sick, poor handicapped, no longer able to contribute to society, senile, living in nursing homes and so on. Although some of these characteristics apply to millions of older persons, they are not descriptive of most older persons. The elderly who have lived 60, 70 or 80 years have been molded by their heredity, health, family education, occupation and numerous social economic, and cultural factors. With the passage of time they have become increasingly complex individuals, and they make up a highly heterogeneous population.

Older adults fall into three sub-groupings: those in middle age are likely to be at the peak of their careers and the fulfillment of their hopes, but are beginning to think about retirement, those for whom retirement has become a fact rightfully should be able to live up to high expectations; those in old age experience a decline with increasing dependency posed upon state of health, economics, and social changes.

PSYCHOLOGICAL AND BIOCHEMICAL CHANGES

Process of Ageing

Ageing is a normal process begins at conception and ends only with death. Individuals are known to age at different rates. Heredity and good nutrition may slow the ageing process so that the individual enjoys physical and mental vigour in his eighties. Goal of nutritional care should be to help the aged achieve a healthy, purposeful and independent living.
The process of ageing is initiated from the moment of birth and continues throughout the life. Older adulthood can be certainly a more fulfilling and happy period of life if one is conscious of certain important psychological, social, physiological and nutritional changes occurring in one’s life (Vora, 1997).

Ageing is a developmental process, part of the cycle, beginning at conception and ending with death. Old age is defined as the age of retirement, for it is at that time the combined effect of ageing, social changes and diseases are likely to cause a break down in health (Natarajan, 1994). The ageing of the global population is one of the biggest challenges facing the world in the next century.

The universal phenomenon of ageing cannot be stopped for it is inevitable. The elderly population is growing much faster than the population as a whole. Due to improved health facilities, life standards and other socio-economic factors, average life expectancy has gone up considerably which resulted in sharp increase in the elderly population. In the Indian context, people who have attained 60 years and above are considered old whereas in developed countries it begins only at 65 year. The rapid ageing of population, particularly of people over the age of 85 is a worldwide phenomenon (Kumudam, 2002).

One prominent theory of ageing the free radical theory involves the continuous formation of free radicals as a result of exposure to oxygen and harmful exposure to environmental factors. These highly reactive substances lead to damage and alterations in the structure of proteins, lipids, carbohydrates and chromosomal material in cells which probably leads to changes associated with ageing.

Tissue damage by free radicals and pro-oxidant radicals like super-oxide, peroxide and hydroxyl radicals is the basis for inflammatory and degenerative
changes seen in variety of diseases like cancer. Endogenous antioxidants are super oxide dismutase (SOD) catalase (CAT), glutathione peroxidase (GPS) which act together with glutathione (GSH) and a NADPH. With age and in diseases these antioxidants defenses are lowered and the vitamin A, C and E get excessively utilized and a deficiency state occurs.

The process ageing brings about physiological, psychological and immunological changes which influences the nutritional status. The changes associated with ageing are partly influenced by genetic race and gender.

**Body composition**

With ageing a progressive decline in the water content and lean body mass is accompanied by an increasing proportion of body fat. By 80 years it is estimated that half the muscle cells remain. Specific functioning cells are replaced in part by nonspecific fat and connective tissue. The increase in the proportion of body fat occurs even though the weight remains unchanged.

The changes in connective tissue, which is so abundant in the human body, are of special significance. Collagen is one of the fibrous materials found in tendons, ligaments, skin, and blood vessels. With aging the amount of collagen increases and it becomes more rigid; the skin loses its flexibility, the joints creak and the back becomes bent.

**Function of the Gastrointestinal Tract**

The senses of taste and smell are less acute in later years so that some of the pleasure derived from food is lost. Less saliva is secreted so that swallowing becomes more difficult. Because of tooth decay and periodontal disease more than half of persons over 70 years have lost some or all of their teeth. Many have ill-fitting dentures or none at all so that chewing is difficult. Consequently, these
persons eat more soft, carbohydrate-rich foods that fail to provide adequate intakes of protein, minerals and vitamins.

Digestion in later years is affected in a number of ways. Annoying delay of esophageal emptying occurs in many older persons. Hiatus hernia leads to increased complaints of heartburn and intolerance to foods. A reduction of the tonus of the musculature of the stomach, small intestine and colon leads to less mortality so that the likelihood of abdominal distention from certain foods is greater, as is also the prevalence of constipation. The volume, acidity, and pepsin content of the gastric juice are sometimes reduced. In turn there is interference with the absorption of calcium, iron, zinc, and vitamin B-12.

Fats are often poorly tolerated because they further retard gastric emptying, because the pancreatic production of lipase is inadequate for satisfactory hydrolysis and because chronic biliary impairment may reduce the production of bile or interfere with the flow of bile to the small intestine.

**Cardiovascular and Renal Function**

The progressive accumulation of atheromatous plaques leads to narrowing of the lumen of the blood vessels and loss of elasticity. There is a decline in cardiac output, an increased resistance to the flow of blood, and a lessened capacity to respond to extra work. As the rate of blood flow is reduced the digestion, absorption and distribution of nutrients is retarded. A reduced blood flow together with a smaller number of functioning nephrons lessens the glomerular filtration and the tubular reabsorption so that the excretion of wastes and sometimes the return of nutrients to the circulation is less efficient.

**Metabolism**

From age 25 years the basal metabolism decreases about 2 per cent for each decade owing to the increasing proportion of body fat and the lesser muscle
tension. The decline in basal metabolism is less in persons who remain healthy and pursue vigorous activity in their later years. The ability to maintain normal body temperature is also lessened, and hypothermia in the elderly can be especially dangerous.

Carbohydrate Metabolism

Usually the fasting blood sugar is normal likewise, the absorption of carbohydrate is not impaired. However, when a carbohydrate load is presented, as in the glucose tolerance test, the blood sugar remains elevated for a longer period of time than it does in younger persons. Following exercise, the levels of blood lactic acid and pyruvic acid are often above normal limits.

Fat Metabolism

With increasing age the blood cholesterol and blood triglyceride levels gradually increase. The kind and amount of fat and carbohydrate in the diet, the degree of overweight, the stresses of life, and many other factors are believed to be responsible for these changes.

Aging is not a disease

Aging is a normal process, not a disease. An increase in longevity and a decline in fertility have contributed to people living much longer today than ever before in the last 50 years (WHO, 1998).

Among numerous environmental factors that modulate ageing, nutrition plays a significant role. The inseparable triad of nutrition, ageing and health is the logical basis for appropriate management of the problems that arise at the interface of these inter dependent factors (Dwyer, 1994). Although the incidence of many diseases increases with age, the causes of the diseases are often unrelated to aging. They may fully or partially result from the cumulative effects
of diets high in saturated fat and salt and low in fiber, smoking, physical inactivity, excessive stress, or other habits that insidiously influence health on a day-to-day basis. Aging cannot be prevented, but how healthy we are during aging can be influenced by what we do to our bodies.

Maintaining health as age is becoming an increasingly important concern. There are more older adults in the United States than ever before, and the numbers are growing.

**Nutrition issues for adults of all ages**

Researchers and others interested in nutrition and health during middle age and beyond have tended to focus their attention on the cumulative effects of diet on chronic disease. Nutrition exerts its effects on chronic disease development over time, and therefore diseases related to poor diets are most likely to express themselves during the older adult years. The occurrence of diseases related to behavioural traits such as smoking and physical inactivity also increases among adults as they age.

In addition to the health effects of behaviours, people age biologically. The combined effects of poor diets, other risky lifestyle behaviours, and biological aging increase the rates of serious illness during adulthood. How soon a disease develops largely depends on the intensity and duration of exposure to behavioural risks that contribute to disease development. Behavioural factors also affect the progress of biological aging processes.

**Breaking the chains of chronic disease development**

For the most part, the development of chronic disease in middle-aged and older adults can be viewed as a chain that represents the accumulation over time of problems that impair the functions of cells. Each link that is added to the chain, or each additional insult to cellular function, increases the risk that a
chronic disease will develop. The presence of a disease indicates that the chain has gotten too long – that the accumulation of problems is sufficient to interfere noticeably with the normal functions of cells and tissues.

It appears that the chain can be shortened if dietary and other behaviours improve. For example:

- Correcting obesity and stabilizing weight during the adult years may help lengthen life expectancy.
- Reducing saturated fat and cholesterol intake and increasing vegetable and fruit intake may slow or prevent the progression of hardening of the arteries.
- Maintaining adequate calcium and vitamin D intake and engaging in regular physical activity during the adult years may prevent, postpone, or lessen the severity of osteoporosis.
- Consuming enough dietary fiber (20 to 35 grams per day) may decrease the risk of developing diabetes and colon cancer.
- Adequate intake of fruits and vegetables (more than five servings a day) appear to delay or prevent the development of a number of types of cancer and the formation of cataracts that “cloud over” the lens of the eye.

The health status of adults is not necessarily “fixed” by age; it can change for the better or the worse, or not much at all.

**Nutrient needs of older adults**

The biological processes and lifestyle changes that generally accompany aging affect caloric and nutrient needs. A person's need for calories generally declines with age as physical activity, muscle mass and basal metabolic rate
decrease. However, people who remain physically active into their older years maintain muscle mass and have a higher need for calories than people who are inactive.

While caloric need decreases, the requirements for certain nutrients such as protein, vitamin C, vitamin D, vitamin B₁₂, and calcium may increase with aging. The increased need for protein appears to be a result of decreased efficiency of protein utilization by the body or to disease states. Dietary requirements for vitamin C and calcium may increase due to lower levels of stomach acidity that often occur with advancing age. Decreased stomach acidity reduces the body’s ability to absorb vitamins C and B₁₂ and calcium. Vitamin D status may become a problem for older adults for two reasons; their intake of milk and milk products is often low, and exposure of the skin to sunlight produces about half of the amount of vitamin D as it does in young adults. Elderly people are at risk for vitamin D deficiency due to decreased exposure to sunlight or decrease in renal mass. Prudent dietary supplementation with Ca and vitamin D improves bone density and may prevent fractures in a healthy elderly population.

**Does taste change with age?**

Poor diets observed in older adults have been ascribed to “declining taste” with age. Besides being a dreadful thought, it’s not true that taste declines with age to the extent that it makes eating less pleasurable than before. Sight and hearing usually decline with age a good deal more than taste does.

The senses of taste and smell are affected by medications such as antibiotics, antihistamines, some lipid-lowering drugs, and cancer treatments; diseases including Alzheimer’s disease, cancer, and allergies; and surgeries that affect parts of the brain and nasal passages. These treatments and conditions are
more prevalent in older adults than in middle-aged populations and are primarily responsible for declines in the senses of taste and smell. Changes in these senses increase the likelihood that the person will experience food poisoning or consume an inadequate diet and a low intake of food.

Social aspects of nutrition in older adults

Preparing meals and eating right may not be as simple as it sounds for many older adults. Consuming inadequate and balanced diet may not be easy when you depend on someone else to take you shopping, when meal times involve little social life, or when you “don’t feel up” to making a meal. Isolation, loneliness, and poor health can be major contributors to poor diets in older adults. The diets of older people are often lacking in nutrients, and because many older adults do not, or cannot, consume enough nutrients to meet their increased need for them, supplementation may be required.

Factors influencing food habits

The food habits of the elderly are the result of the lifetime influences of cultural, social, economic, and psychological factors. The individual who has had poor food habits throughout life is not likely to be in as good health as the one who has enjoyed the benefits of a good diet. Good diet in later years cannot completely make up for the years of inadequacy or correct irreversible changes. Furthermore, an older individual is not likely to change his or her whole pattern of eating. Nevertheless, even the individual with poor food habits who is in a poor state of nutrition can benefit greatly from the application of the principles of good nutrition.

Socio-economic factors
Insufficient income is probably the chief factor limiting dietary adequacy. About one sixth of persons over 65 years of age in 1980 were below the poverty level (Bureau of Census Poverty Index). Poverty is twice as prevalent in women as in men.

Many persons must rely solely on social security income. Others have pensions and some savings, but fixed incomes make it increasingly difficult to meet ever-increasing costs for the essentials of life. Although Medicare and Medicaid provide substantial benefits for health care, the costs of medications and catastrophic illness can use up life savings and reduce the available income.

Housing is also a major problem for many older persons. Most older people continue to live in their own homes but find it increasingly difficult to pay the exorbitant charges for fuel and other utilities as well as the ever-increasing real estate taxes. Those who live in apartments are often unable to afford higher rents, so they are forced to move to less desirable places. Many live in neighborhoods where they are afraid to walk on the streets because they might be robbed or physically assaulted. Living in a single room with no facilities for food preparation is the lot of many elderly.

Transportation to shopping facilities and physician a serious problem for many older people. Some cannot afford to drive an automobile and others have lost the ability to drive safely. Even those who live near public transportation find it difficult to manage bags of groceries while boarding or getting off vehicles. Nearby independent food stores offer convenience but the food costs are likely to be higher. Many factors contribute to inadequate nutrition in the elderly, the dietician needs to assess the elderly individuals physical function, cognition, mood, socialization and living arrangements, finance and medications as part of the routine nutrition assessment.
Shopping itself can be a problem. With thousands of items in supermarkets, the shopper finds it more difficult to make economical, nutritious choices. Failing vision means that one cannot read the fine print on labels or compare costs of various brands.

**Psychologic factors**

Loneliness and social isolation powerfully affect food intake. Upon retirement some elderly persons lose their sense of worth, since they are no longer consulted for advice or see their former coworkers. Some older adults have lost their loved ones, live far away from their children, or are neglected by their relatives. They often have little desire to prepare meals and may eat only those foods that are conveniently available. Others eat compulsively to assuage their feelings of loneliness, depression, and despair. Erratic eating habits in turn perpetuate the mental depression.

**Food misinformation and faddism**

Older adults are justified in their hopes that a nutritionally balanced diet throughout life will improve health and prolong life. However, the present generation of elderly have had less education than the younger generations, and they may be more influenced by exaggerated claims for health foods and supplements. Advertising for these products usually extols the values they have in correcting deficiencies and removing symptoms. The individual makes a self-diagnosis based on a graphic description of symptoms and buys the product to alleviate these symptoms, real or imagined. Although the products is likely to be safe, it is often not needed and the money spent could better be used for a good diet. More important, by self-diagnosis one may wait too long before seeking medical advice.
Nutritional requirements

Nutritional principles apply to all age groups but is more important during old age. The process on ageing bring about physiological, psychological, and immunological changes which influences the nutritional status. Ageing begins at conception and ends only with death. Heredity and good nutrition may slow the ageing process so that the individual enjoys physical and mental vigour in his eighties. Goal of nutritional care should be to help the aged achieve a healthy purposeful and independent living (Srilakshmi, 1999). Nutrient’s requirements are based on physiological changes that take place during old age. The nutrition requirements change after the age of 30 years.

Nutrition is said to influence age-related rate of functional decline in a wide variety of organ systems (Green, 1994).

Energy

After the age of 35 the basal metabolic rate decreases due to reduced muscle mass and other metabolically active tissue mass. Also there is reduction in physical activity which affects the energy needs.

Sarcopenia, an age related loss in skeletal muscle is the result of a decline in muscle strength. Sarcopenia contributes to changes in gait and balance and loss of physical function. Lean body mass declines approximately 2 to 3 per cent per decade. Body protein level in the healthy elderly is 30-40 per cent less than that in young adults.

The average body fat percentage in males increases from about 15 per cent when young to 25 per cent at the age of 60 years. This change in body fat is
attributable to less intense physical activity and to an alteration in testosterone and growth hormone production that affects anabolism and lean tissue growth.

The calorie intake should be adjusted to maintain the body weight constant. In the case of obese the calorie intake should be adjusted to reduce the body weight gradually to about normal level.

Energy requirement decreases with age beyond 30 years. The adjustment factor given earlier by FAO/WHO/UNU is adopted for Indians are used for computing the energy requirements of different age periods.

Although the energy requirements decrease, the requirements for protein, vitamins and minerals do not diminish.

Protein

As people age there is a decrease in skeletal tissue mass. This results in decrease in store of protein provided by skeletal muscle and may be inadequate to meet the needs for protein synthesis. Hence the dietary protein intake is more important to meet essential needs.

A protein intake of 1.0 g per kilogram, the normal adult requirement significant, is safe during old age. Since caloric requirements are decreased without the corresponding decrease in protein, the food should be protein rich compared to normal adult food. To meet this adequate quantities of protein foods such as milk and curd can be included.

Due to decreased appetite and poor digestion, old people are likely to consume less protein. The serum albumin level is the most reliable indicator of protein nutriture. Deficiency of protein results in oedema, anaemia and lowered resistance to infection. Infection, altered gastrointestinal function and metabolic
changes caused by chronic disease can reduce the efficiency of dietary nitrogen utilization and increase nitrogen excretion.

Of the total caloric intake 11-12 per cent should be from protein.

**Carbohydrate**

An impaired glucose tolerance in the elderly can lead to hypoglycaemia, hyperglycaemia and type II diabetes mellitus. Insulin sensitivity can be enhanced by balanced energy intake, weight management and regular physical activity. Emphasis is placed on complex carbohydrates and controlling the intake of simple sugars. Whole grain cereals and pulses should be included in the diet.

It is necessary that at least 50 per cent of calories are derived from carbohydrates. Since caloric requirements are reduced, carbohydrates intake is also reduced.

**Lipids**

Emphasis should be placed on reducing the intake of saturated fat and choosing mono-unsaturated or poly unsaturated fat sources.

**Minerals**

Calcium needs during old age increases. Women over 50 years of age who are not receiving estrogens require more calcium as there is increased losses resulting in demineralization of bone and osteoporosis. For women over fifty years, 1000 mg/day mineral is recommended for the following reasons.

(a) Calcium is available only from a limited number of foods.

(b) To compensate age-related bone loss and to improve calcium balance.

(c) To decrease the prevalence of fractures and dental decay.
The physiology of calcium homeostasis in ageing men over 65 is similar to that of women with respect to the rate of bone loss. Calcium absorption efficiency decreases, vitamin D levels decline and hence men also require more calcium.

Milk is an important source of calcium for elderly as it is in the diet of the young. Wise provisions for calcium throughout life may go far in assuring an above average measure of health, an increase in vitality and perhaps in the lengthened prime of life. As caloric requirement decreases, total food consumption decreases, hence calcium supplements are essential.

The iron deficiency seen in the elderly is due to inadequate iron intake, blood losses due to chronic disease and/or reduced non-heme iron absorption secondary to achlorhydria of atrophic gastritis. Iron absorption *per se* does not appear to decline significantly with age. Vitamin C deficiency may also impair iron absorption.

Mild anaemia affects the health of old people due to less efficient circulation of blood. Iron intake should be adequate to prevent anaemia. Iron requirement can be same as adult man (30 mg). If there is anaemia, supplemental iron can be given. Consumption of liver once or twice a week is effective in combating such a tendency. Particular emphasis may be placed upon the inclusion of those green leafy vegetables which are good source of iron like cauliflower greens and whole grain or enriched breads and to certain iron rich dry fruits, and use of iron fortified salt.

There is no evidence that moderate sodium restriction will delay or prevent the onset of cardiovascular disease. It is believed that great restriction of sodium should not be attempted except under the advice of a physician in the
treatment of specific disease condition. Infact, moderate amounts of salt help to improve the palatability and thus the acceptability to the diet.

Some features of old age such as delayed wound healing, decreased taste sensitivity and anorexia are also findings associated with zinc deficiency. However, healthy elderly subjects have been shown to be in zinc balance despite an apparent low dietary intake. Older people who avoid flesh foods may be at increased risk of poor zinc status.

**Vitamins**

Elderly people are at risk for vitamin D deficiency due to decreased exposure to sunlight or decrease in renal mass. Prudent dietary supplementation with calcium and vitamin D improves bone density and may prevent fractures in a healthy elderly population.

Stress, smoking and some medications can increase vitamin C requirement. The antioxidant vitamins, such as vitamin E, carotenoids and vitamin C have been promoted as agents that enhance the health of the elderly. Vitamin C may be protective against cataract at an intake level of between 150 and 250 mg per day which is possible to achieve from dietary sources alone. Vitamin E has also been found to be a potent nutrient for reducing the decline in cellular immunity that occur in the elderly.

Requirements for the vitamin B₆ are increased in many elderly persons owing to atrophic gastritis which interferes with absorption. Alcoholic and liver dysfunction are additional risk factors for a deficiency of vitamin B₆. It has a significant role in immune function. Alcoholism is a risk factor for folate deficiency. Severe deficiency of folic acid in the elderly may result in anaemias and elevated serum homocysteine levels a risk factor for cardiac disease. Diets
are often lacking in folate, so consumption of folate rich foods should be encouraged.

The usual causes of vitamin B$_{12}$ deficiency are atrophic gastritis and bacterial overgrowth, which decrease absorption and can lead to pernicious anaemia.

Recent research has shown that increased serum levels of vitamin B$_{6}$, IB$_{12}$ and folate confer protection against elevated serum homocysteine an independent risk factor for cardiovascular disease, depression and certain neurologic deficits.

Although over nutrition is relatively uncommon in the healthy elderly population, a maintenance level multi vitamin and mineral supplement may enhance immunity and may cure latent nutritional deficiency states that may be the basis for common complaints of some individuals.

All vitamin requirements remain the same as the adult requirement.

**Water**

It is essential for the older person as it is for the younger individual. The kidney can function more adequately when there is sufficient fluid (1.5 litres) and hence to eliminate the waste solids. Water stimulates peristalsis and thus aids in combating constipation. Water can be consumed as such or in the form of butter milk, fruit juices, porridge and soups.

Some elderly individuals may have a fading sense of thirst and may go for long periods without fluid. Others avoid liquid for fear of incontinence. Dehydration can result in mental confusion, headaches and instability. Elderly should be advised to consume some fluid at regular intervals even if they are not thirsty.
Fibre

Fibre stimulates peristalsis. There is great enthusiasm to encourage the consumption of fibre containing food but any increase should be gradual otherwise bowel discomfort, distension and flatulence will result. While rough fibre, bran and mature vegetables are not advised for the aged, the fibre of tender vegetables, fruits will make easier the passage of the food mass down the intestinal tract.

Fibre also helps in reducing cholesterol which may reduce the incidence of atherosclerosis. Excess of fibre may reduce the absorption of iron and certain trace elements.

FOOD REQUIREMENTS

In nearly 60-65 years of one’s life habits, especially those pertaining to diet usually get moulded by factors like heredity, health, family, education, occupation and numerous other social, economic and cultural factors. They are set in their ways and they cannot totally modify their whole pattern of eating.

The elderly prefer well cooked food in the soft form or semisolid form. This may be due to the fact that elderly suffer from loss of teeth or wear dentures.

Due to dental problems if the elderly are not able to eat common raw vegetables they can be used as grated vegetables or chutneys made with green leafy vegetables. Porridge can be prepared with unrefined cereals. Instead of chapathis, whole wheat rava upma can be given. Similarly, if mastication and deglutition are problems, modification of food and beverage consistency may be indicated. The danger in dysphagia is that the person may choke on foods or beverages that are swallowed too rapidly. Aspiration pneumonia is the greatest risk in such cases.
For many elderly persons, swallowing difficulty occurs as a result of poor dentition, stroke, Alzheimer's disease or other dementias. Thin liquids (other than pure water taken alone in small sips) may need to be avoided. Thickening agents in food can be used.

Alteration in appetite may be due to ageing process affecting the centre in the brain for appetite. Physical, social and emotional problems may interfere with appetite.

There is a considerable difference in taste preference among the elderly which may be attributed to decline in taste perception as age advances. Elders usually do not prefer sweets, salty foods or fried foods.

Certain whole pulses may produce flatulence in the elderly. Hence such pulses should be avoided in the diet. Sulphur containing vegetables are avoided if they produce gas and discomfort for the elderly.

The general principles for planning a nutritious diet for the elderly are similar to those for younger adults. The most important guideline is to provide meals and snacks that are nutrient dense, visually appealing, tasteful and of the appropriate consistency. Four or five smaller meals are often more acceptable than three substantial ones.

NUTRITION RELATED PROBLEMS OF OLD AGE

Nutrition is also found to be linked with many chronic diseases that afflict the elderly (Morley, 1997). Hence nutrition is found to be a key factor for successful ageing. Nutritional risk or problems inherent in the ageing population needs to be monitored and modified to prevent malnutrition. Nutritional problems in the elderly occur either as a result of impaired food intake or reduced nutrient utilization. These are contributed mainly by certain physical, social, functional, psychological and certain medical factors (John, 2004). Older
people are at nutritional risk, not only because of impaired digestion, absorption or utilization of nutrients associated with chronic disease or drug nutrient interactions, but also due to an interaction between physiological, psychological and socio-economic factors (Charlton, 2001).

The elderly are at a risk of poor nutrition due to economic pressures, poor dentition, reduced mobility, depression loneliness, ageing tissues and inadequate food consumption.

Osteoporosis

It is a condition associated with a loss in bone density and bone mass and is primarily found in middle age and elderly women who had early menopause and had sedentary life. Its major symptom is an increased vulnerability to bone fracture.

In young people in good health, the rate of calcium resorption equals that of bone formation. As people age, resorption begins to predominate over the bone formation, eventually resulting in osteoporosis. In osteoporosis the total amount of bone is reduced, but the remaining bone is of normal composition and quality.

Due to the reduction in number of cells, there is a decrease in thickness of the cortex, a thinning of the trabeculae and increased porosity of bone. As a result fractures occur with greater frequency. Common fracture sites include the vertebrae, femur and radius and often these occur in spite of little or no trauma. The rate of femoral fractures alone doubles for each decade after the age of 50.

The cause of osteoporosis may be age related changes such as decreased estrogen production associated with menopause. The decline in circulating 17-beta-estradiol is the predominant factor in the accelerated bone loss that begins after the menopause and continues for 6 to 8 years. Decreased intestinal
absorption of calcium and production of vitamin D, reduced physical activity 
and increased parathyroid hormone secretion may also cause osteoporosis.

The compact bone mass in the vertebrae is responsible for humped backs 
characteristic of many elderly people. Dissolution of the jaw bone is another 
frequent symptom of osteoporosis. It is a major contributing factor in periodontal 
disease, resulting in premature loss of teeth.

Although ageing is one universal and unavoidable factor that brings a risk 
of osteoporosis. Many avoidable risk factors like sedentary life-style, emotional 
stress, inappropriate diet may contribute for osteoporosis.

It is sensible to encourage all old people and especially those with 
radiological evidence of osteoporosis, to be as physically active as possible. The 
more they are on their feet; less is the risk of pathological fractures of the femur 
and spine.

It is logical for old people to take a diet with ample calcium that is to 
drink 2-3 glasses of milk regularly. Some old people have a markedly reduced 
capacity to absorb calcium from the gut and in such patients therapeutic doses of 
calcium salt might be of benefit. Adequate protein along with calcium also helps 
in the formation of bone tissue.

The incidence of osteoporosis is low in India compared to western 
countries. Prevalence of osteoarthritis in women is steadily increasing with age 
and obesity.

A study to assess the incidence of osteoporotic fracture was conducted 
among women admitted to the hospital by National Institute of Nutrition (98-99). 
It was observed that over 55 per cent of women above the age of 40 years 
had osteoporotic fractures, which confirms the problem of early onset of 
osteoporosis particularly among low socio-economic groups.
Treatment

Calcitonin and oestrogen are prescribed for osteoporosis. Calcitonin inhibits the reabsorption of bone calcium into the blood but has only a relatively short lived beneficial effect of 1 to 2 years. Oestrogen therapy in post menopausal women has been shown to slow the rate of bone loss although it does not stimulate new bone formation. It is much more effective as a preventive measure begun immediately after menopause than as a treatment of osteoporosis that has already developed. In the longer term, oestrogen treatment, results in increased parathyroid hormone and 1,25 (OH)$_2$ D synthesis, which may explain the observed improvement in the intestinal absorption and renal reabsorption of calcium.

Plant based estrogens or phytoestrogens are used as adjunctive therapy for alleviating the symptoms of menopause. Phytoestrogens are nonsteroidal estrogens of dietary origin. Phytoestrogens in soya (isoflavones) may reduce the incidence of hot flashes, one symptom of menopause. Soya isoflavones may also protect women against osteoporosis by the action of genistein, which has an effect similar to estrogen. It stimulates osteoblasts, the bone-forming cells.

Weight bearing exercise may help increase Bone Mineral Density by imposing stresses through repetitive impact loading. Resistance training (weight lifting, squeezing a tennis ball, stretching exercises, sit ups, trunk extensions, aerobic exercise) may help by exposing bone to varying loads and rates of strain. Improved muscle strength may enhance coordination and balance and protect against falls and fractures. Although an exercise regimen that includes both weight-bearing and resistance-training routines has a greater impact on BMD, even a simple weight-bearing programme performed at moderate intensity may be beneficial.
Exercise combined with adequate calcium and vitamin D intake may have a modest effect on slowing the decrease in bone mineral density in post menopausal women.

The most effective preventive measures are, ensuring calcium intake in adequate amounts throughout life and adopting a lifestyle that involves regular exercise and avoiding the avoidable risk factors.

**Obesity**

Some of the elderly are obese because their consumption of calories has not decreased though there is steady decrease in calorie requirement. Sedentary life style may also be a contributing factor. Obese are susceptible to diabetes and mortality rate may be higher.

**Neurological dysfunction**

Problems of disorientation and a slowing of neurological functioning, both seen in the elderly, have been attributed to various nutrient factors. A lack of niacin has long been associated with the dementia and depression of pellagra, a deficiency of choline hampers the synthesis of the neurotransmitter acetylcholine. Deficiencies of vitamin B₆ and thiamine are associated with central nervous system problem.

Women who walk or exercise regularly are less likely to experience the memory loss and other declines in mental function that can come with ageing.

**Anaemia**

Anaemia, characterized by feelings of fatigue, anxiety, lack of energy and sleeplessness is a common result of inadequate iron. Iron inadequacy can be caused by low dietary intake, impaired absorption possibly resulting from lack of haem iron or vitamin C or blood loss. Treatment may involve using iron
supplements together with a diet providing iron sources of high bio availability and vitamin C to enhance absorption.

Pernicious anaemia is seen chiefly in middle ages and elderly persons (women aged between 45-65). Plasma vitamin B<sub>12</sub> is below 160 ng/l while plasma folate is usually normal. Hydroxy cobalamin should be given in a dosage of 1,000 mcg. The diet should include animal foods like liver, egg yolk, shrimps and curd.

Malnutrition

The important causes of malnutrition during old age are poverty, inability to move around easily, cumulative effects of chronic diseases necessitating multiple medications, social isolation and lack of knowledge for adequate preparation of meals. Malnutrition is common among old people who are institutionalized.

Constipation

It is the infrequent passage of stools which are most often drier or harder than normal. Generally, it is uncomfortable and elimination can be difficult and painful. ‘Common symptoms of constipation include bloating, sluggishness, a feeling of “fullness” in the rectum and a general sense of “feeling out of sorts”.

The stools become hard and dry because the stool moves too slowly through the colon. The natural contractions or rhythms of the colon might be disturbed due to loss of tone, stress, medication, illness, resisting the urge to defecate, pain from haemorrhoids or tissues, lack of exercise, a low fibre diet or not drinking enough fluids. It may even be caused by overuse of stimulant laxatives or enemas.
Constipation can be prevented by eating regular meals, drinking plenty of fluids and doing exercise daily. One should respond to the urge to move bowels and avoid straining. And by adding fibre to the diet, constipation can be prevented.

DEGENERATIVE DISEASES

Oxidative stress is able to promote the process of ageing and also able to increase the probability of age specific disease like atherosclerosis and cancer where free radicals are implicated. The incidence of cancer increases progressively with age. Resistance to disease declines in the elderly.

Vitamin E retards coronary artery diseases. Diabetes mellitus in which vitamin C metabolism plays important role prevents complications. Persons with high antioxidant intake are less likely to develop certain cancers. Ocular diseases in which β carotene is thought to decrease the risk of developing advanced or exudative age related macular degeneration. People with low serum carotenoids levels had more than 5½ times the risk of developing cataracts than those with normal levels.

Antioxidants, vitamin C, E and β carotene, thought to be protective largely because they can inactivate free radicals which would otherwise damage the cells. Three daily servings of vegetables and two of fruits are recommended to fulfill these antioxidant vitamin requirement. Until more evidence is available it is prudent to advise intake of 600 g/day of antioxidant rich food.

Disease like diabetes, atherosclerosis, hypertension and cancer and disability disorders like bone fractures, arthritis and strokes may affect nutrient requirements, intake, digestion, absorption, metabolism and excretion.

If the damage from free radicals occurs within the collagen fibrous network underlying the skin, one may notice a sagging of the tissue, the
appearance of fine lines and wrinkles and discoloration of the pigment. What we often assume are simply the visible signs of normal ageing are often the premature effects of excessive oxidative damage. This can be slowed down or even halted through nutrition supplements. Antioxidants, toss the electron hungry molecules (free radicals) and keeping them from damaging the body’s cells. Antioxidants should be given to prevent degenerative diseases.

The elderly are more prone to diseases due to lowered food intake, physical activity and resistance to infection. The elderly need more calcium, iron, zinc, vitamin A and antioxidants to prevent age related diseases. Good food habits and regular exercise minimize the ill-effects of ageing.

**Common complaints during old age**

Clinical and biochemical investigations conducted by Natraj, *et al.* 1991, have shown that fatigue, alteration in appetite, alteration in weight, shortness of breath and giddiness and joint pains are the common complaints during old age. Fatigue may be due to coexisting diseases like diabetes or ischemic heart diseases or due to pulmonary tuberculosis. Blunting of taste sensation may be due to degenerative changes in the parietal lobe of brain in old age. Loss of weight during old age may be due to consumption of less calories. Hypertension, diabetes and anaemia may be the cause of giddiness.

**Other health problems**

The incidence of chronic diseases such as arthritis, diabetes mellitus, and those of the gastrointestinal tract, and the cardiovascular and renal systems increases with age. Some problems associated with these conditions that health professionals might encounter in working with any group of older persons are described briefly below.
Arthritis afflicts a significant number of older persons who may need assistance in shopping for food and preparing it. Health professionals need to be aware of the many false claims for treatment and cure by a special diet or some device. A diet that meets nutritional requirements contributes to a sense of well being although it is not likely to modify the arthritic process. Those persons who are obese will experience some improvement by losing weight, thereby reducing the load on weight-bearing joints.

Periodontal disease is highly prevalent after age 35. It is characterized by a loss of bone mass in the jaw followed by loosening of the teeth and their eventual loss. With the continuing bone loss, dentures will fit poorly, so that chewing becomes difficult. Marked improvement in nutritional status is often possible when appropriate dental care is given. The following list includes foods that are appropriate when chewing is difficult.

Occasional social drinking of alcoholic beverages is not considered harmful to the elderly; it may even be beneficial. Alcohol addiction, on the other hand, is a serious problem that afflicts a million or so older Americans. It is particularly damaging when money available for the purchase of food is spent instead for alcoholic beverages. Excessive use of alcohol can lead to mental confusion, and may interfere with the metabolism of some medications.

Constipation in older persons results in part from reduced tonus of the lower intestine. However, the most important contributing factors can be controlled by the individual; ingesting 1,200 to 2,000 ml fluid daily; increasing fiber intake by including generous amounts of fruits, vegetables, and whole grain breads and cereals; and regular habits of elimination.
Objectives

1. To know the socio-economic status of old age people living in urban and rural areas.

2. To assess the food habit and quality of food taken by the old age people.

3. To find out whether the existing dietary pattern are satisfactory or not.

4. To find out association between diet and nutritional deficiency diseases.

5. To know the working capacity, role of impairment, type of exercises, activity pattern and type of treatment used by elderly.

6. To compare the diets of urban old age people with those who lived in rural areas.

7. To develop a package on balanced diet for elderly.