
UNIT 4 NUTRITION FOR THE ELDERLY

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4.0 OBJECTIVES

After reading this unit, you should be able to:

- Discuss the steps for assessment of the nutritional status of the elderly
- Enumerate the physiological and structural changes which require dietary alterations;
- Determine the nutrient needs of elderly
- Describe the diet related degenerative diseases; and
- List rules for formulating diets for them

4.1 INTRODUCTION

You are all aware of the vital importance of foods for the protection and promotion of our health. You also know that foods have different functions and that all foods are not the same regarding their specific functions. Their functions depend on the types and amount of nutrients which they contain.

There are macronutrients like protein, fat, carbohydrates and some minerals which are needed in large amounts like calcium and phosphorus. On the other hand, some nutrients are needed in minute amounts which are known as micronutrients. Vitamins and some minerals such as vitamin A, C, E, iron, selenium and iodine are also needed in small amounts, but are vital for body functions and are included in this category.

The body's requirement of food, both the types and the quality, depends on the stage of the development of the body. Infant need more milk, young children need easily digestible protein and mineral rich food and adolescents need growth promoting foods to take care of their rapid growth and development during puberty.

Once one reaches adulthood, the body starts ageing. As the body ages, there are structural and functional changes which may be associated with functional decline; the need for nutrients also changes considerably. While growth is not occurring, the body needs nutrients for repair and maintenance as well as protection from disease. You have already read about the biological changes with ageing in the first unit of this block and on the changes in immunity in the second unit. Elderly individuals must eat foods which respond to their special nutritional needs. At the same time, intake of some foods during this time may increase the risk of chronic non communicable diseases like diabetes, coronary artery disease and hypertension.

In this unit you will learn about the dietary alterations that are required with ageing. You will also learn some basics regarding diets that can be provided to the elderly for healthy ageing and prevention of chronic non communicable diseases.

4.2 NUTRITIONAL ASSESSMENT OF ELDERLY

You must be aware that body weight is one of the most common indicators used to assess whether a particular individual is well nourished or not. There

Points to Ponder

What is the difference between nutritional assessment and nutritional status ?

Answer

The strategy to determine the extent and severity of nutritional problems is called nutritional assessment or assessment of nutritional status. Nutritional status is defined as the state of health of an individual as affected by the intake and utilization of nutrients.

are several other methods of measuring the nutritional status of the elderly. For example, in clinical practice, doctors can identify persons suffering from malnutrition by clinical examination. Some biochemical parameters like haemoglobin are estimated to assess the iron status among individuals. Dietary intakes are also evaluated to understand whether the individual is consuming adequate amounts of food.

So we can classify the methods of nutritional assessment into 4 categories commonly referred to as ABCD:

- Anthropometric assessment
- Biochemical evaluation
- Clinical examination
- Dietary evaluation

4.2.1 Anthropometric assessment

Anthropometric assessment is based on the concept that an appropriate body measurement reflects any morphological variation occurring due to a significant functional physiological change.

The most commonly used measurements for adults and elderly are:

- **Body weight:** Body weight, indicative of the body mass is composed of constituents like body water, minerals, fat, protein, bone etc. Body weight is sensitive even to small changes in nutritional status, caused by short duration illnesses and therefore is a good indicator in elderly. Among the elderly, unexplained weight loss in the past 3 months should be further investigated as it a cause of concern.

Weights should be taken with minimal clothing, without shoes and without holding any support. A weighing scale maybe used to measure weight to the nearest 0.1 kg.

- **Height:** The height of an individual is influenced by hereditary and environmental factors he/she is exposed to. An individual's maximum growth potential is determined by hereditary factors (parent's height).

Height can be measured to the nearest 0.1 cm with an anthropometric rod or a stadiometer. It is taken without shoes with the subject standing erect on a flat surface with the arms hanging naturally at the sides. The head should be held comfortably erect, with the lower border of the eye orbit in the same horizontal plane as the external auditory meatus (hole of the ear). The headpiece of the anthropometer rod should rest, without much pressure, on the top of the central part of head.



- **Body Mass Index (BMI):** BMI is calculated as the ratio of weight (in kg) / Height² (m²) is referred to as Body Mass Index (BMI). BMI has a good

Did you know?

Nutritional anthropometry is measurement of body dimensions such as weight, height, body circumferences etc.

Think and Reflect

What do you think could be the causes of unexplained weight loss ?

Points to Ponder

Why among the elderly, height may not be considered an accurate measure of nutrition status.

Answer

This is because, with increasing age, there is kyphosis of the spine and a stooping posture maybe acquired.

correlation with fatness (over weight or obesity). In the case of adults, the following classification is extensively used at present (Table1). While WHO has given cutoffs of BMI to measure body fatness, separate set of norms have been developed for Asians including Indians as they accumulate more fat than Caucasians at the same BMI (Table 4.1)

Table 4.1: Cut offs for BMI (kg/m²)

Classification	WHO cut offs	Asian Cut offs
Underweight	< 18.5	
Normal	18.5 -24.9	18-22.9
Overweight	25 –29.9	23-24.9
Obesity grade I	30 – 34.9	25-29.9
Obesity grade II	35-2-39.9	30-34.9
Obesity grade III	>40	>35

- **Waist and hip circumferences:** Waist to hip ratio is the ratio of the waist circumference in cms to the hip circumference in cms. The cut offs are 0.8 for women and 1.0 for men,

However, WC is preferred over WHR as a measure of abdominal obesity with Asian Indian specific cut-offs as the WHR maybe high even if the person is not obese. These cutoffs for WC are 80 cms for women and 90cms for men.

- **Skinfold Thickness:** The percentage of fat deposited under the skin increases with increasing weight. The thickness of this sub-cutaneous fat can be measured at various sites with the use of standardized Skin Callipers. The distribution and amount of sub-cutaneous fat changes with age and is influenced by sex. In adults, sex differences are marked. Subcutaneous fat is about 11% of body weight in men and 18% in women. As the amount of fat distributed from place to place in the body varies, it has been suggested that the sum of skinfold thickness from different areas reflects a better picture of the total body fat.

Points to Ponder

Why is it important to clinically examine the elderly patient for any nutritional deficiency signs and symptoms ?

Answer

Clinical examination is one of the common tools used to assess the extent of clinical forms of undernutrition. Clinical signs are changes in the body which are indicative of nutritional deficiency/excess

4.2.2 Biochemical Evaluation

Biochemical assessment deals with measuring the level of essential dietary constituents (nutrient concentration, metabolites) in body fluids (usually blood and urine) which is helpful in evaluating the possibility of malnutrition. When there is a deficiency of any nutrient in the body, the levels of their metabolites are affected, even before clinical signs are manifested. Hence, subclinical deficiencies can be detected much earlier than the clinical deficiency state, and if treated in time help to maintain the health of the elderly individual. In the elderly, the biochemical findings must be correlated with the other evaluations for correct judgments of the problems.

The range of biochemical tests that can be used is considerable. You will read more about these tests in the practical units.

4.2.3 Clinical Examination

There are many nutritional deficiencies which manifest as clinical signs e.g. vitamin A deficiency affects the eyes. A list of common signs and symptoms associated with nutritional deficiencies is given in Table 4.2.

Table 4.2: Clinical signs and symptoms

Nutritional deficiency disorder	Clinical signs and symptoms
Chronic energy deficiency	<ul style="list-style-type: none"> • Loss of subcutaneous fat • Extreme muscle wasting – “skin and bones” • Loss of weight • Loose and hanging skin folds • Weakness • Frailty • Loss of strength
Vitamin A Deficiency	Changes in the eye such as <ul style="list-style-type: none"> • Conjunctival xerosis: dryness of the transparent membrane that covers the cornea and lines inside of the eyelid • Xerophthalmia (including keratomalacia): leading to irreversible blindness cornea becomes soft and raw and easily infected • Bitot’s spot: dry foamy, triangular spots appearing on the temporal side of the eye • Night blindness: inability to see in dim light
Iron Deficiency Anemia	<ul style="list-style-type: none"> • Paleness of conjunctiva • Paleness of tongue • Paleness of mucosa of soft palate • Swelling of feet in severe anaemia • Spoon shaped nails
Riboflavin Deficiency	<ul style="list-style-type: none"> • Angular stomatitis- lesions on both angles of the mouth • Glossitis - Tongue bright red or magenta • Cheilosis - Lips become red and develop cracks
Niacin Deficiency	<ul style="list-style-type: none"> • Dermatitis - Symmetrical skin lesions evident only on areas exposed to sunlight • Diarrhoea • Dementia
Vitamin C deficiency	<ul style="list-style-type: none"> • Spongy bleeding gums • petechial hemorrhages
Osteoporosis	<ul style="list-style-type: none"> • Bone pain • Frequent falls and fractures
Fluorosis (excess of fluoride)	Mottled teeth with chalky white and brownish areas with or without erosion of enamel

4.2.4 Dietary Evaluation

Diet evaluation of individuals can be done in several ways. The most common ones suitable for elderly are:

Different Perspectives of Process of Ageing

Did you know?

The 24-hour dietary recall method is probably the mostly widely used method of dietary assessment.

Points to Ponder

1. What is the limitation for use of 24 hour dietary recall method among the elderly?

Answer

The limitation is that if the respondent has a poor memory, their recall of the foods eaten in the prior 24 hours maybe affected.

2. What is the main limitation of the food record method?

Answer

The main limitation of this method is that recording food intake requires a literate subject who is willing to cooperate.

Think and Reflect

Which method do you think you would like to adopt for dietary evaluation of the elderly and why ?

- **24-hour dietary recall method:** The 24 hour dietary recall method is used to collect dietary intake data of individuals by interview or by completing a questionnaire. In this method, the individual is interviewed regarding the food intake for the past 24-hours in detail. The respondent recalls in household measures what foods were eaten, when, how much, how the food was cooked, what were the ingredients and other such details. Generally, while conducting the survey for elderly, both the respondent and the caregiver (or the person who cooks the food) is contacted. The dietary intakes are assessed in terms of cooked food with the help of standardized household measures, which are then converted to raw amounts of the ingredients and the nutrients present determined.

It is ideal to do this exercise for 2 working days and 1 holiday to capture any variations that may be there. However, in case of elderly, the diet patterns are fixed and usually not much variation is seen.

- **Food Record or Diary:** In the food record or diary method, the subject records, at the time of consumption, the type and amounts of all foods and drinks consumed. This is done for a period ranging from 1 to 7 days. Portion sizes are estimated using standard measures or food items are actually weighed. The strengths of the food record method are that it does not depend much on memory because the subject records food and drink consumption at the time of eating.
- **Food Frequency Method:** The food frequency method derives qualitative information about the dietary intake of individuals or groups. It consists of asking individuals (by interview or checklist) how often (daily, monthly, weekly) they consume specific foods. This reflects their diet patterns. The underlying principle of food frequency method is that the long term food consumption pattern is more important than intake on a few specific days.

A food frequency questionnaire or checklist consists of two components: a list of foods and a frequency of use option to determine how often each food was eaten. Usually, the foods are grouped into categories (based on the objectives of the survey). They are also considered one of the methods of choice for research on diet-disease relationships on both the macronutrient and micronutrient levels. The limitation of food frequency questionnaire is that since the food list is limited to 100 or fewer foods and food groups, these must be representative of the most common foods consumed by individuals in a sample. A longer list is often considered to be too much of a strain for the elderly to complete.

Check Your Progress 1

1. What is BMI? How can you evaluate it to assess adiposity in an individual?

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2. List the clinical signs you will look for in vitamin A deficiency

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3. Which method would you use to evaluate the diet of an elderly individual who has memory loss?

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4.3 FACTORS AFFECTING DIETS DURING OLD AGE

There are a number of factors which affect diet in the old age. Let us study them one by one in the subsequent subsections.

4.3.1 Physiological factors

You have already learnt in the unit of this block that as one grows older, many physiological changes occur both in function and structure of body organs. The body composition often changes with the active muscle tissue proportion decreasing and being replaced with adipose tissue. The metabolic rate slows down and hence the need for energy declines. Demineralization of bones occurs and may lead to osteoporosis. Functioning of various organs like the liver and kidney also is affected as one grows older.

Did you know?

Every individual ages at a different rate, hence every aged person may not have the same level of functional decline.

The gastrointestinal tract, from the oral cavity to the rectum, play a very important role in digesting the food, absorbing the nutrients, and throw out the unwanted portion as faeces. The different segments of the gastrointestinal tract undertake different functions. Physiological and structural changes occur in the gastrointestinal tract due to ageing and need alterations of dietary pattern. A summary of these changes and their effect on food preferences and on consumed diet are given in Table 4.3 .

Table 4.3: Changes in the digestive system which may affect dietary intakes

Affected part of the body	Changes in aging	Alterations of nutritional needs and dietary pattern
Taste buds on the tongue	Atrophy of certain types of taste buds	Lowered threshold of certain taste especially for sweet and sour foods. Elderly, prefer to eat more sweet foods and take more sugar in tea.
Teeth	Loss of teeth	Difficulty in mastication (chewing) and preference for soft mashy food and liquid foods. Elderly individuals usually avoid vegetables, especially green leafy vegetables and whole fruits which need use of teeth e.g. apple.
Stomach	Gets smaller in size with reduced gastric enzymes, which are necessary for digestion	The common practice of two big meals a day will cause gastric discomfort and digestive disturbance. The meal should be smaller in volume and to be taken 3 or 4 times a day.
Intestinal tract	Atrophy of muscles of intestine leading to reduced motility (lazy intestine), and reduced digestive enzyme	Undigested foods remain in the intestine for a longer time resulting in gas formation (flatulence) and constipation and other type of intestinal disorders. Doctors term this as dyspepsia and recommend various dietary changes.

4.3.2 Socio-Psychological Factors

Besides physiological changes, diets in old age are affected by several socio-psychological issues. Living alone impacts the diet tremendously; the old person may have difficulty in procuring and cooking food. The person living alone may lose the enthusiasm of preparing and eating food. It has been seen that people enjoy food more in the company of others. Loneliness, anxiety, depression affect the food intake adversely. Death of a spouse is a trauma which may adversely impact the elderly also.

After retirement, most elderly face financial constraints and may restrict the consumption of expensive foods like nuts, fruits, milk etc.

4.3.3 Lifestyle Related Factors

Retirement and ageing bring about a marked change in the lifestyle of the person. The daily routine changes, physical activity may get reduced, and even social interactions with family and friends maybe impacted.

Successful ageing highlights the importance of active engagement with life, implying that the elderly person should meet friends, indulge in a hobby, lead an active life to remain healthy as they grow older.

Physical activity is an important component of a healthy lifestyle and the elderly should adopt some form of regular physical activity like walking, golf, yoga, dance etc. An effective way is to increase calorie expenditure by physical activity-walking, cycling and undertaking various types of exercises.

Physical activity has another important beneficial effect which is quite often forgotten. All physical activities are associated with increased blood circulation to almost all organs of the body which not only has protective action on various tissues but also prevent tissue degeneration. Osteoporosis, mentioned earlier,

Think and Reflect

How do the lifestyle related factors differ in an urban elderly from that of an elderly living in the rural areas.

is a condition of the long bones which become less dense through lack of calcium and fragile which gets easily fractured even in minor falls. This is the commonest cause of hip bone fracture in elderly. Increased blood circulation in physical activity is an important preventive measure.

Smoking and alcohol could have harmful effects on their health and therefore should be discouraged.

4.4 NUTRITIONAL REQUIREMENTS IN OLD AGE

Nutrient needs of the elderly are influenced by their present physical state, activity, their food habits and the various psychological and social influences and stresses in their lives.

ICMR has given separate recommendations for elderly only for energy. Recommendations for all other nutrients remain similar to those for young adults

4.4.1 Energy

- ICMR (2020) has given lower requirements for energy for elderly as compared to adults as the elderly have a different body composition and considerably lower basal metabolism compared to the adult man or woman. There is also reduction in physical activity with increasing age. There is decrease in energy with age by approximately 20% between 60-69 years of age and 30% between 70-79 years.

Further ICMR (2020) has given the energy requirements for males and females above 60 years with different body weights engaged in moderate and sedentary activity. (Table 4.4).

4.4.2 Macronutrients - Protein, Carbohydrates and Fats

- Proteins:** There is loss of skeletal tissue mass in elderly. Lowered intakes of protein would result in depletion of muscle mass and sarcopenia.

With respect to protein requirements, values given for adult male and female are 0.83 g/kg/day which could also be applied to elderly. Thus for elderly men, a daily intake of 54 g and 45.7g for elderly women has been suggested. The recommendations also include that 10-15% of the total energy should come from protein.

Table 4.4: Energy Requirements of Elderly Males/ Females (60 years and above) with different body weights and activity levels (kcal/day)

	Body weight (kg)	BMR (kcal)	Activity		
			Sedentary	Moderate	Heavy
Males	45	1003	1404	1805	2306
	50	1055	1478	1900	2427
	55	1108	1551	1995	2549
	60	1161	1625	2089	2670
	65	1213	1699	2184	2791
	70	1266	1772	2279	2912
	75	1319	1846	2374	3033

Different Perspectives of Process of Ageing

	Body weight (kg)	BMR (kcal)	Activity		
			Sedentary	Moderate	Heavy
Females	40	930	1303	1675	2140
	45	972	1361	1749	2235
	50	1013	1419	1824	2331
	55	1055	1477	1898	2426
	60	1096	1535	1973	2521
	65	1138	1593	2048	2616
	70	1179	1650	2122	2711

ICMR (2020)

Did you know?

Foods rich in n-3 PUFA are marine sources like oily fish (salmon, tuna, mackerel, sardines) fish oils, and Vegetable sources like flax seeds, walnuts, canola, soybean oils, green leafy vegetables, legumes – rajmah, cowpea, soybean.

- **Fat:** With advancement of age, since the energy requirements are reduced, the requirement of carbohydrates and fats also are reduced. ICMR (2020) has recommended 20%-30% energy from total fats for adults and elderly. The visible fat intake for adults with sedentary, moderate activity has been set at 25, 30 g/d for adult man and 20, 25 g/d for adult women. This level is also applicable to elderly. To achieve intakes of individual fatty acids in Indians, suitable combinations of vegetable oils to be used for different food applications has been also emphasized. There is a realization that effort to increase the dietary levels of total fat and n-3 PUFAs would contribute to lifelong health and well-being. Inclusion of foods which provide LCn-3 PUFAs is also recommended for the prevention of DR-NCD.

- **Carbohydrate:** Carbohydrates are required to prevent protein utilisation as a source of energy. The quantity and quality of carbohydrates are important to maintain good health and have been indicated substantially to impact nutrition related chronic disorders. ICMR (2020) has recommended 55-60% energy from carbohydrates for adults and also applicable to elderly. There should be emphasis on increasing intake of complex carbohydrates to provide fiber.

4.4.3 Micronutrients - Vitamins and Minerals

- **Calcium and Phosphorus:** Requirement of calcium may increase in the presence of Vitamin D because of decreased absorption, extra obligatory loss of calcium in urine resulting in demineralization and porosity of bones. However, no modification has been suggested in the calcium and phosphorus level of elderly men. Hence the same level as adults, of 1000 mg/day, has been recommended. However for post menopausal women the requirement is 1200 mg. Like most of the other age groups Ca: P ratio recommended for elderly is also 1:1.
- **Iron:** Iron needs for adult men are 19 mg/day and are not affected by ageing, however among women, after menopause menstrual losses of blood no longer take place, hence iron needs reduce from 29 mg/day for adult women and become similar to adult men at 19mg/day.
- **Vitamin A:** Ageing does not affect the requirement of this vitamin; hence the same level as adults ie 1000ug /day for men and 840 ug/day for women can be considered adequate for elderly.
- **Vitamin D:** Risk of Vitamin D deficiency increases as synthesis decreases and kidneys are less able to convert Vit D 3 to the active form. The skin

responsiveness and exposure to sunlight also decreases. Recommendations for Vitamin D are 600 IU for adults with emphasis on the importance of outdoor physical activity. For elderly confined indoors, supplements of Vitamin D should be taken.

- **Vitamin E:** requirement for adults is 7.5-10 mg/day and **Vitamin K** 55ug/day. No separate recommendations have been given for elderly.
- **Thiamine, Riboflavin and Niacin:** As age advances B group vitamins are essential in maintaining cognitive ability and neuromuscular integrity. The daily intake of these vitamins is related to the energy requirements. Since energy needs decrease with advancing age, the amounts of thiamin, riboflavin and niacin would correspondingly decrease. For sedentary adult men and women the Committee recommends the requirements of thiamine as 1.4 mg/day. Riboflavin requirements are 2 mg/day for men and 1.9 mg/day for women and 14 mg/day and 11 mg/day for niacin respectively.
- **Other B group vitamins:** Vitamin B6 supplementation enhances immunocompetence which declines on ageing. Folate may provide protection by lowering homocysteine levels, a risk marker for CVD and neurological deficits. There is low intake of vitamin B12 in elderly so the risk of deficiency increases. Further there is decline in secretion of gastric acid which facilitates B12 absorption

For adults the daily recommendations for pyridoxine are 1.9 mg/day for sedentary adults, folic acid 300 ug /day and 220 ug/day for adult men and women respectively and cyanocobalamin 2.5 mg/day. There are no separate recommendations for elderly.
- **Vitamin C:** Recommendations of Vitamin C are the same for elderly as for adults ie 80 mg/day for men and 65 mg/day for women.
- **Zinc:** Recommendations for zinc for adult men and women is set at 17 mg/day and 13.2 mg/day respectively and also apply to elderly. Intake of zinc decreases in relation to decrease in energy intake. Zinc is associated with impaired immune function, anorexia, delayed wound healing, pressure ulcers and loss of sense of taste.

Other constituents

- **Water:** For old-age, irrespective of gender, the present consensus for daily water requirement from beverages is 33 ml per kg body mass for sedentary activity and 38 ml per kg body mass for moderate activity.
- **Fiber:** The level of about 40 g/2000 kcal has been considered as safe intake of fiber for adults and can be considered for elderly also.
- **Antioxidants:** A minimum of 400 g/day of fruits and vegetables is recommended to obtain sufficient amounts of antioxidant nutrients such as beta-carotene, vitamin C and certain non nutrients like polyphenols and flavonoids which may protect against chronic diseases.

Points to Ponder

What are the daily requirements in an elderly?

Answer

Summary of daily recommendations

Fat : 20-30% energy

CHO: 55-60 % energy

Protein: 10-15% energy

Males: 54 g

Females: 45.7 g

Calcium: 1000 mg

Iron: 19 mg

Vitamin A:

Males: 1000 ug

Females: 840 ug

Vitamin D: 600 IU

Thiamine: 1.4 mg

Riboflavin: Males: 2 mg.

Females: 1.9 mg

Niacin: Males: 14 mg

Females: 11 mg

Vitamin B6: 1.9 mg

Folic acid:

Males: 300 ug

Females: 220 ug

Vitamin B12: 2.5 mg

Vitamin C:

Males: 80 mg

Females: 65 mg

Zinc: Males: 17 mg

Females: 13.2 mg

Fiber: 40 g/ 2000kcal

Check Your Progress 2

1. Why do energy needs decrease with ageing? What would be the energy requirement for a 70 year old woman doing sedentary work and weighing 60 kg?

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2. What are the requirements of iron and fiber for elderly?

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4.5 PLANNING DIETS FOR ELDERLY INDIVIDUALS

Ageing is a gradual but inevitable phenomenon. Most organ systems lose approximately 1% of their functioning each year, starting at age 30 when senescence begins. As you are aware, a number of systemic and socio-psychological changes are associated with growing old. The physiological changes associated with growing old are summarized in **Box 4.1**.

Did you know?

Needs for energy decrease with ageing because of decrease in BMR, decrease in body composition and a reduction in physical activity.

Change in body composition
Body weight alterations
Poor bone health
Diminished sense of taste/smell/vision
Decreased neuromuscular coordination
Anorexia nervosa
Decline in immunocompetence
Poor oral health
Renal changes
Cardiovascular changes
Neurologic and Psychological

Box 4.1: Physiological changes with ageing

These changes result in varying degrees of decline in functionality and efficiency and subsequently lead to alteration in dietary needs.

4.5.1 Diet Planning for Elderly: Considerations

As we have discussed, as one grows older, the body composition changes which affect the nutritional needs of the elderly. Hence the following points need to be kept in mind while planning diets for the older population.

- Elderly require reduced amounts of energy, as their lean body mass and physical activity decrease with ageing. Intake of energy dense foods like sweets, fried foods or high fat foods needs to be reduced. However diets should contain all the other nutrients and need to be balanced.
- Foods rich in saturated fat and trans fats should be avoided and substituted with oils which have high levels of monounsaturated fatty acids and polyunsaturated fatty acids.
- Plenty of milk and milk products, fresh fruits and vegetables especially green leafy vegetables will help provide adequate amounts of protein, vitamins, minerals and dietary fibre.
- Fibre should be included either in the raw form, if the elderly do not have any other chewing problems, or as cooked soft food.
- For healthy ageing and prevention of age-related degenerative diseases, elderly need more calcium, iron, zinc, vitamin A and antioxidants.
- Small frequent meals are preferable in place of large ones as the elderly may sometimes not be able to tolerate large quantities of food.
- Diets of elderly may need to be altered in texture and consistency if they have chewing problems and foods should be mechanically, chemically and thermally bland.i.e. neither too hard, nor too spicy or too hot/ cold. Soft cooked foods like porridges, soft vegetables, and meats, well cooked eggs, milk and its products and soft fruit can be included. Fruit can be stewed to increase acceptability.
- Moreover elderly are sometimes lonely and depressed so food should be served in a pleasant manner to stimulate their appetite and cheer them up.

Think and Reflect

What specific advice do you think you will give an elderly to cut down on their diet to reduce calories?

Think and Reflect

How can you increase the fibre content of the diet of elderly?

Functional Foods and Longevity

Functional foods are foods which offer health benefits which extend beyond their nutritional value. Nutrient rich foods like fruits and vegetables, nuts, seeds and grain are considered functional food as well.

Oats contain a type of fiber called beta glucan, which has been shown to reduce inflammation, enhance immune function, and improve heart health.

Other examples are fruits and vegetables, soy, flax seed, tomatoes, garlic and citrus fruit.

To sum up, elderly are more prone to diseases due to poor food intake, physical inactivity and lowered resistance to infection. Hence, good food habits and regular physical activity are required to minimize the ill effects of ageing and to improve the quality of life.

4.5.2 Dietary Counseling

Diet counseling is one of the most useful methods for assisting an older adult to arrive at a solution for his problems. It incorporates the idea of working with a patient, encouraging him to make changes in his pattern of living that he sees as desirable and attainable and supporting him.

Points to Ponder

What are the advice for diet to an elderly?

Answer

- Eat a variety of nutrient-rich foods.
- Match food intake with physical activity.
- Eat food in many divided portions in a day.
- Avoid fried, salty and spicy foods.
- Consume adequate water to avoid dehydration. Exercise regularly.

Dietary Guidelines 2011, (NIN)

Different Perspectives of Process of Ageing

Dietary counseling provides individualized nutritional care for encouraging the modification of eating habits. It may also assist in prevention or treatment of nutrition-related illnesses such as obesity, diabetes, cardiovascular disease and hyperlipidemia.

Dietary counseling can be tailored to meet the treatment needs of patients on diagnosis of specific illnesses, can help reduce complications and/or side effects, and can improve general well-being.

When considering the appropriate counseling approach for an individual with a specific illness, particular attention should be given to usual food choices, food likes and dislikes, learning style, cultural issues, and socioeconomic status. In addition, factors such as lifestyle, time available for food preparation, work schedule, and personal food preferences must be considered.

Dietary counseling would involve taking information on the following:

- medical history, including assessment of any nutrition-related illnesses, and biochemical and anthropometric measures
- dietary assessment (dietary analyses)
- psychosocial evaluation, including food-related attitudes and behaviors
- sociological evaluation, including cultural practices, housing, cooking facilities, financial resources, and support of family and friends
- nutrition knowledge
- readiness to learn or change; as well as learning style analyses
- current exercise and activity level.

Diet counselling can help to reinforce sound eating habits, give positive suggestions to improve poor habits, discuss reasons for diet modification, guide and practice planning meals meeting specific modifications, train in various feeding techniques and help in explanation of various assessment and treatment techniques.

Now let us consider a few tips for diet counselling for the elderly

- Develop a trusting helping relationship with the elderly and establish rapport with them.
- Build on dietary practices and attitudes which are established
- Motivate them on making changes in their dietary habits by focussing on the positive influences of a good diet
- Encourage them to participate whole-heartedly in the counseling programme.
- Interact with them and discuss all issues
- Bring reluctant people into the group by means of group discussions

Check Your Progress 3

1. What are the common considerations elderly should keep in mind while planning their diets?

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2. List functional foods which elderly could use commonly in their diets.

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4.6 DIET RELATED DEGENERATIVE DISEASES IN ELDERLY

Here you will learn about the commonly reported degenerative diseases in the elderly. These have a tremendous impact on the nutrient needs, food patterns and nutritional status of the affected individuals.

Today, ageing nutrition care focuses not only on disease management or medical nutrition therapy; it has broadened with a stronger focus on healthy lifestyles and disease prevention.

Think and Reflect

Which do you think are the degenerative diseases in elderly which are related to the diet?

4.6.1 Diets in Obesity and Chronic Energy Malnutrition

Obesity is a complex issue related to genes, environment and the environment including lifestyle. Environmental and genetic factors interact with psychological, cultural, and physiologic influences to promote obesity in individuals. Obesity may also be associated with a number of complications which may result in decreased longevity.

Did you know?

Incidence of overweight and obesity is higher among the elderly especially in women.

As you may recall, depending on their weight status, individuals may be classified as underweight, normal, overweight or obese as per classification given by WHO (2004) and Misra et al (2009) in Table 4.5.

Table 4.5: Classification of Overweight and Obesity

Classification	BODY MASS INDEX kg/m ²	
	WHO (2004)	ASIANS
Underweight	< 18.5	< 18
Normal	18.5- 24.9	18.0- 22.9
Overweight	25.0- 29.9	23.0- 24.9
Obesity	> 30	> 25

Source: WHO (2004), Misra (2009).

Management of obesity for the elderly should bring about a gradual and sustained weight loss and maintain a good nutritional status. For this integration of healthier food choices, exercise and lifestyle modification is necessary.

Points to Ponder

What should be the goal of obesity treatment?

Answer

Obesity treatment should focus on weight management and attaining the best weight possible in the context of overall health.

- **Energy:** Balancing energy intake and energy expenditure to achieve weight loss is the basis of weight management in the elderly.

Energy intake can be calculated on the basis of body weight and activity of the individual as per Table 4.6.

Table 4.6: Energy Requirements As Per Activity

Activity	Energy requirements (kcal/kg IBW/day)		
	Obese	Normal	Underweight
Sedentary	25	30	35
Moderate	30	35	40
Heavy	35	40	45

Steady gradual weight loss over a longer period favors reduction of fat stores, limits the loss of protein stores, and avoids the sharp decline in RMR that accompanies rapid weight reduction.

Weight goals should be individualized and realistic, with reduction of body fat as the focus. The diet should be nutritionally adequate except for energy, which is lowered so that the fat stores are mobilized to meet daily energy needs.

- **Protein:** A generous protein intake, i.e. 15% to 25% of energy, is needed to prevent conversion of dietary protein to energy.
- **Carbohydrate:** The low-calorie diet should be individualized for carbohydrates (55en%-60 en%), by including sources like vegetables, fruits, and whole grains. Plenty of fibre rich foods are recommended to reduce caloric density, to promote satiety by delaying stomach-emptying time, and reduce intestinal absorption.
- **Fat:** Fat content should not exceed 20% of total calories.
- **Vitamins and Minerals:** These can easily be provided through generous amounts of fruits and vegetables which are low in energy and also a source of fiber. Supplements that meet age-related requirements are usually recommended with less than 1200 kcal for women or 1800 kcal for men.
- **Alcohol:** Regular use of alcohol contributes to the calorie intake and may result in fat deposition and weight gain. Hence, alcohol like foods high in sugar should be limited to small amounts.

Did you know?

A 500-1000 kcal daily decrease in calories helps to lose ½-1 kg body weight in a week.

Feeding pattern

- ✓ Diets of obese elderly should be nutritionally adequate and well balanced.
- ✓ Adequate amounts of all nutrients should be ensured despite the decreased energy needs.

- ✓ Foods rich in saturated fatty acids and trans fats should be avoided and replaced with oils containing high levels of MUFA and PUFA like mustard oil, sunflower oil, soyabean oil, olive oil, canola to prevent complications of obesity.
- ✓ Low fat milk, lean meats, unsweetened beverages, can be taken
- ✓ An adequate intake of calcium from lean proteins- dairy, meats, and leafy vegetables is necessary to compensate for its losses
- ✓ Fibrous fruits and vegetables, whole grain cereals and pulses, oats and traditional multigrains should be consumed. Modification in consistency to make the diet soft and well cooked may be required.
- ✓ Artificial sweeteners and fat substitutes may improve the palatability and acceptability of foods.
- ✓ Satiety value of the diet is extremely important to prevent hunger pangs

Role of Exercise

Exercise and other forms of physical activity have an important role to play in weight loss and weight maintenance. Exercise increases LBM in proportion to fat and helps to counter the loss of LBM and reduction of RMR that accompany intentional weight reduction. Other positive side effects of increased activity include strengthening cardiovascular integrity, increasing sensitivity to insulin, and expending additional energy and therefore calories.

Adequate levels of physical activity appear to be 45 to 60 minutes daily.

Chronic Undernutrition

Some causes of undernutrition in the elderly include impaired absorption and utilization of nutrients, chronic diseases, multiple medications, diminished sense of taste or smell, dysphagia, and other problems that make eating difficult. Social causes may include living alone, loneliness and depression, financial issues and limitations in shopping for and preparing food.

This may manifest as Chronic Energy Deficiency (CED), deficiencies of iron, folic acid and Vitamin C manifested as Anemia. Zinc, pyridoxine, vitamin A, vitamin C and vitamin E deficiency are also common and may impair the immune functioning among elderly. Frailty is often related to micronutrient deficiencies, especially in women. Further these may increase the risk of morbidity, increased risk of falls, fatigue, memory loss and depression.

Various strategies can be undertaken to decrease chronic under-nutrition. For example:

- Increase in caloric and protein intake. This can be done by encouraging older underweight adults to eat energy-dense and high-protein foods.
- Adding gravies and creams can increase the energy density of the food preparation and also soften foods for easier chewing.
- Offering more choices and liberalizing diet restrictions.

Did you know?

Behavior modification is the basis of lifestyle intervention. It focuses on restructuring a patient's immediate environment, dietary intake, and physical activity.

Points to Ponder

Include micronutrient rich foods in the diets of elderly people to enable them to be healthy and active.

Different Perspectives of Process of Ageing

- High intakes of cereals, pulses and tea rich in iron absorption inhibitors should be discouraged to combat anaemias. High vitamin C rich fruit and vegetable consumption may favour iron absorption.
- In a clinical setting nutritional oral supplements and enteral feedings may be used.

Check Your Progress 4

1. Enumerate the objectives of dietary management for an obese individual.
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2. List the foods that should be restricted in the diet of an obese elderly individual
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3. Describe the practical advice you would give to a 70 year old female who is underweight with a BMI of 16.0 kg/m²
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Did you know?
Lifestyle modification (diet and physical activity) improve hyperglycemia, dyslipidemia, and blood pressure. In no other disease does lifestyle play such an important role in prevention and treatment than in diabetes.
Studies comparing lifestyle modifications to medication have established the benefit of weight loss and physical activity in preventing or delaying the onset of diabetes.

4.6.2 Diets in Diabetes Mellitus

Another important disorder which is very common in elderly is Diabetes Mellitus. This is a group of diseases characterized by elevated blood glucose levels resulting from defects in insulin secretion, action, or both. Most diabetics are obese which also causes some degree of insulin resistance. You will be reading about diabetes in details in the unit 4 of Block 1 of MME 106, however, we shall deliberate on nutrition in a diabetic elderly here.

Medical Nutrition Therapy is an overall treatment which is integral to total diabetes care and management. This requires a personalized approach with effective nutrition planning, self-management, education and support. Medications, diet management, regular monitoring of blood glucose, A1C and lipid levels, blood pressure, weight, and quality-of-life issues are the cornerstone of successful diabetic management.

The goals of medical nutrition therapy are

1. To promote and support healthful eating patterns specifically to:
 - Attain glucose, blood pressure, and lipids goals
 - Achieve and maintain ideal body weight
 - Delay or prevent complications of diabetes
2. To address individual nutrition needs based on personal and cultural preferences
3. To provide practical guidance to diabetics for meal planning

Nutritional Management

- **Determining Energy Requirements**

Weight loss is strongly recommended as the solution to improve glycemic control.

A reduction in energy intake is also as important, than the actual weight lost. This can be achieved by calculation of IBW (based on weight and height) or on the basis of kilocalories prescribed per kg IBW according to activity and weight status (Table 4.6).

- **Macronutrient Percentages**

There is no ideal proportion of calories from carbohydrate, protein and fat for all diabetics. Total energy intake is more important than the foods providing the energy. It is recommended that diabetics should consume 45-65% energy from CHO, 20-35% from fat and 10-35% from protein.

- **Carbohydrate intake**

The total amount of carbohydrate eaten is the primary predictor of glycemic response. Besides the quantity, the type of carbohydrate consumed also influences blood glucose levels.

Day-to-day consistency in the amount of carbohydrate eaten at meals and snacks improves glycemic control especially in persons on MNT alone, glucose-lowering medications or insulin.

Foods rich in carbohydrate include starches, e.g. cereals like pasta, rice, atta, suji, bajra, ragi etc; pulses like dals, beans and lentils, starchy vegetables like potatoes, fruits and fruit juices, sweets and desserts.

A key strategy in achieving glycemic control includes monitoring total carbohydrate intakes by use of carbohydrate counting, exchange plans or experience based estimates.

The type of carbohydrate and its distribution between meals depends on the line of treatment being followed i.e. diet, medications or insulin.

Soluble fiber present in oats, barley legumes and fruits has a beneficial effect as it improves sensitivity to insulin. Intake of about 40 g dietary fiber is beneficial. High fiber foods include whole cereals, whole pulses and legumes, leafy vegetables and beans.

Did you know?

In Carbohydrate counting food portions contributing 15 g of carbohydrates (regardless of the source) are considered as one carbohydrate serving.

Different Perspectives of Process of Ageing

Glycemic Index (GI) which is the blood glucose response of certain foods is also important in determining whether to include them in the diabetic diet. Foods with GI less than 55 are considered low GI, 55 to 70 as moderate and more than 70 as high GI. Some examples of low GI foods are peas, rajmah, lentils, apple, orange, leafy vegetables like methi, curd, oats, barley, buckwheat .

Points to Ponder

What are the lists into which the food groups are placed ?

Answer

Exchange lists group foods into lists— carbohydrates, which includes starches, fruits, milk, sweets, desserts, and other carbohydrates, and nonstarchy vegetables; meat and meat substitutes; fats; and free foods. Each food list is a group of measured foods of approximately the same nutritional value.

- **Protein intake:** This is the same as that for a normal adult varying from 1-1.5 g/kg IBW accounting for 10-35% total energy
- **Fat intake:** Total fat intake should be between 20-35% energy with the lower limit for obese adult diabetics. The ratio of PUFA: SFA: MUFA should be < 10%, <10% and the remaining as MUFA. Foods like fish help in imparting omega 3 fatty acids so should be promoted. Cholesterol intake should be limited to less than 300 mg. Trans fat intake should be minimal
- **Diet and feeding pattern:** The dietary pattern of diabetics should be regular and consistent. Overeating at any meal as well as skipping meals should be avoided. The amount and time of food intake particularly carbohydrate should be controlled so that blood sugar levels do not fluctuate beyond normal range. As already discussed fiber rich foods especially soluble fiber are beneficial. Steamed, baked preparations may be preferable to fried ones.

You may recall low GI foods are those which produce a slow glycemic response. So whole pulses and whole grains, roasted channa, chappatis sprouts whole fruit are more suitable than boiled rice washed dals and fruit juices.

- **Foods not allowed/restricted:** Some foods like glucose, sugar, honey, sweets, chocolates and candies are not allowed. Foods like potatoes, yam, colocasia, mangoes, grapes, banana, alcoholic beverages, fried foods like parathas, pakoras, namkeens etc, dry fruit, cakes and pastries should be avoided.
- **Exercise Recommendations:** People with diabetes should perform a minimum of 150 min/week of moderate-intensity aerobic physical activity or at least 90 min/ week of vigorous aerobic exercise. The physical activity should be distributed over at least 3 days/week and with no more than 2 consecutive days without physical activity.

To sum up, for managing a diabetic, a variety of interventions should be implemented. These include medications, diet and lifestyle modification including reduced energy/fat intake, carbohydrate counting, healthy food choices and physical activity.

Think and Reflect

Try to plan a diabetic diet for an elderly with body weight 50 kg and height 5 ft.

Check Your Progress 5

1. Enumerate the objectives of MNT for an overweight diabetic woman ?

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2. List five foods that should be given freely and restricted in the diet of a diabetic elderly individual

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4.6.3 Diet in Cardiovascular Disorders

Cardiovascular disorders like atherosclerosis, myocardial infarction, angina pectoris, congestive cardiac failure and hypertension are extremely common in the elderly. They are a major cause of mortality in the aged population. They have multiple risk factors including heredity, cigarette smoking, physical inactivity and obesity. Elevated serum cholesterol and dietary fat play a major role in the etiology

Nutritional management

The diet used is a normal diet which is low in saturated fat and cholesterol. This is called a **Prudent Diet**. This involves the following modifications

- **Energy:** Since most of the patients are obese, intake has to be adjusted for maintenance of desirable body weight. For gradual weight loss, a daily reduction of 500-1000 kcal can be made. This can also help normalize lipid profile and lower blood pressure.
- **Protein:** Normal intake is recommended ie 1g/kg body weight preferably from lean meats, skimmed milk and its products, soya protein and foods of vegetable origin which also contain fiber which has a hypocholesterolemic effect. Vegetable protein, in addition, is low in sodium, so is also beneficial to hypertensives. Soya protein also provides isoflavones which are cardioprotective.
- **Fat:** Modification in total fat intake is recommended. This should provide 20-30% of energy with only 20% for those with higher serum cholesterol levels. The kind of fat also needs to be modified with substitution of PUFA and MUFA (vegetable oils) for SFA (butter, animal fat, hydrogenated fat etc). P/S ratio of 0.8-1.0 should be maintained
- **Cholesterol:** Intake should be restricted to less than 200-300 mg/ day. Foods high in cholesterol like egg yolk, organ meats, whole milk, cream, butter and cheese should be restricted in the diets
- **Carbohydrates:** It is recommended to include complex carbohydrates. Liberal use of whole pulses, whole cereals, oats, beans, fruits and vegetables should be done. Simple sugars should be restricted.
- **Minerals and Vitamins:** These should be in normal amounts with emphasis on antioxidant and protective vitamins like Vitamin A, C, E.
- **Sodium:** Sodium can be restricted to 1500- 3000 mg /day (moderate restriction) especially for those with hypertension.

- **Potassium and calcium:** Potassium and calcium rich foods like milk, fruits and vegetables and green leafy vegetables should be included in the diet for hypertensives

Dietary Pattern and Food Selection

The dietary pattern should be regular with well spaced meals. Small, frequent meals are preferable rather than large ones as they prevent strain on the heart.

Steamed, baked,boiled preparations are preferred to fried ones.

Alternate seasonings, herbs and flavourings may be used to increase the palatability of sodium restricted diets.

A liberal intake of fruits and vegetables is recommended as they provide antioxidants and phytochemicals.

Foods restricted/avoided: Foods high in saturated fat and cholesterol as butter, cream, eggs, fatty meats, whole milk, khoa and cheese; hydrogenated fat like vanaspati and margarine, foods high in sugar such as mithais, desserts, cakes and pastries.

Sodium rich foods: Chutneys, pickles, sauces, foods preserved in brine, baked foods like breads and cakes containing sodium salts, green leafy vegetables.

4.6.4 Diets in other Chronic Illnesses

Osteoporosis

Osteoporosis and bone fractures are a major cause of disability and death among older persons. It is estimated that 50% of elderly have osteoporosis and the majority of these are females. The primary cause for this is post menopausal deficiency of oestrogen but this can be precipitated by chronic calcium and vitamin D deficiency. Factors such as physical activity and smoking are also closely associated.

Calcium, vitamin D and protein supplementation can help to prevent the onset of osteoporosis and maintain bone health. Other minerals like copper, magnesium, manganese, zinc and vitamin K, essential fatty acids and phytoestrogens from soyabean and other plant sources help in maintaining bone density with age.

So a healthy overall food pattern is probably more important for maintaining bone health for older persons.

Cancers

Intake of diets which are consistently high in fat may contribute to cancers of some origins- cancer of the breast, colon, prostate, rectum and ovaries. Other dietary factors like intake of smoked, nitrate cured foods and alcohol intake may also be cancer causing. Healthy food choices including high fiber foods, high intake of fruits and yellow and green vegetables, selenium, vitamin E and calcium also protect against cancers of various organs.

Other chronic conditions

Obesity exacerbates conditions such as rheumatoid arthritis and osteoarthritis which are very common in older persons. An elderly patient with arthritis should be especially careful to avoid being overweight as excessive weight adds stress to joints which are already painful.

An inverse relation has been suggested by studies between liberal intakes of carotenoids and the incidence of age-related macular degeneration, a leading cause of irreversible blindness among elderly

So, you have learnt here about some of the common diet related degenerative diseases which are faced by the elderly. We have discussed here dietary management in obesity, chronic undernutrition, diabetes mellitus, cardiovascular disorders and some other chronic conditions like osteoporosis, cancers, arthritis etc.

Check Your Progress 6

1. What is a prudent diet?

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2. List foods that are rich in saturated fat and should be restricted in the diet of a patient suffering from cardiac disease

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4.7 GLOSSARY

Anthropometry	: The science of body measurements
Obesity	: Excessive deposition of fat in the body
Functional foods	: Foods which offer health benefits which extend beyond their nutritional value.
Glycemic Index	: Is the blood glucose response of certain foods is also important in determining whether to include them in the diabetic diet
Prudent Diet	: A diet which meets the nutrient recommendations but avoids excesses of fat, sugar and salt.

4.8 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1. BMI is Body Mass Index which is an indicator to assess body fatness. It can be determined by measuring the height and weight of an individual and calculating the ratio of weight (in kg) / Height² (m²). The value obtained can be compared with the Asian cutoffs to assess whether the person is obese or not.
2. Symptoms of vitamin A deficiency are:
 - Conjunctival xerosis: dryness of the transparent membrane that covers the cornea and lines inside of the eyelid
 - Xerophthalmia (including keratomalacia): cornea becomes soft and raw and easily infected
 - Bitot's spot: dry foamy, triangular spots appearing on the temporal side of the eye
 - Night blindness: inability to see in dim light
3. As the person has memory loss, the 24 hour recall method would not be suitable and a food diary or record method would be more apt. The person would need to record all items of food or drink consumed whenever he eats or drinks. This should be done for 7 days to get a fair idea of his food intake.

Check Your Progress 2

1. Energy requirements decrease with age because of changes in body composition, decrease in basal metabolic rate (BMR) and reduction in physical activity.
Energy requirements for a 70 year old woman having a weight of 60 kg and doing sedentary work would be 1535 kcal
2. Elderly men need 19 mg Fe/day which is the same as adult men. Elderly women however need less than adult women as there are no menstrual losses after menopause and requirements become similar to adult men.

Check Your Progress 3

1. Elderly should keep in mind that they need lesser energy than adulthood, should avoid food rich in saturated fat and substitute with oils, include iron, calcium rich foods, have enough fiber, have small frequent meals and make foods soft in texture if they have chewing problems
2. Common functional foods which elderly could use in their diets: oats, soya, fruits and vegetables, nuts, seeds like flax seeds and citrus fruits

Check Your Progress 4

1. Goals of dietary management of obesity for the elderly should be to bring about a gradual and sustained weight loss and maintain a good nutritional status. For this integration of healthier food choices, exercise, and lifestyle modification should be done

2. Elderly obese should restrict saturated fat- whole milk, butter, ghee, red meats, refined carbohydrates, sugars , very sweet fruits and high calorie beverages.
3. An underweight elderly woman with no other complications can be advised to Increase caloric and protein intake by eating energy-dense and high-protein foods like milk shakes, milk based desserts , adding gravies and creams to increase calories. They should be offered more choices and diet restrictions liberalized.

Check Your Progress 5

1. The objectives of MNT for a diabetic are to achieve and maintain a desirable body weight, to provide relief from symptoms, to maintain normal blood sugar levels and to prevent the onset of chronic complications
2. Foods like sugar, sweets, potatoes, banana, fried foods, cakes and pastries should be restricted in the diet of an obese diabetic while whole grain, whole pulse, roasted channa, , lean meats and green vegetables can be given.

Check Your Progress 6

1. A Prudent diet is a normal diet which is low in saturated fat and cholesterol. In addition it is modified for energy since most people are obese, should have normal protein preferably from lean protein and vegetarian sources like soya and pulses, complex in place of simple carbohydrates which are rich sources of fiber and emphasis on antioxidant and protective vitamins like Vitamin A, C, E.
2. Foods which are rich in saturated fat and should be avoided in a cardiac patient are : Butter, ghee, whole milk, khoa and cheese, organ meats and hydrogenated fat

4.9 FURTHER READINGS

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