
UNIT 2 NUTRITION

Structure

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2.0 OBJECTIVES

After reading this unit, you will be able to:

- enumerate the physiological and structural changes which require dietary alterations;
- list rules for formulating diet;
- describe the diet related degenerative diseases; and
- discuss the role of anti-oxidants in diet.

2.1 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 micronutrients like protein, fat, carbohydrates and some minerals which are needed in big amounts like calcium and phosphorus. On the other hand, some nutrients are needed in minute amounts which are known as micronutrients. Vitamins and some mineral are needed in small amount, but are vital for body functions, are included in this category. Important micronutrients are vitamins A, C, E, iron, selenium and iodine.

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 early digestible protein and mineral rich food and so on. Adolescents need growth promoting foods to take care of their rapid growth during puberty.

As the body ages with structural and functional changes associated with functional decline, its needs for nutrients also change considerably. The elderly individuals must eat foods which respond to their special nutritional needs. At the same time, foods which are undesirable in old age, by converting physiological aging into pathological aging by making the body suffer from age related clinical disorders like diabetes, coronary artery disease and cerebro-vascular accidents like strokes, should be strictly avoided.

In this unit you will learn about the dietary alterations that are required with aging. You will also learn some basic types that can be provided to the elderly for healthy aging.

2.2 PHYSIOLOGICAL AND STRUCTURAL CHANGES REQUIRING DIETARY ALTERATIONS

The gastrointestinal tract, from the oral cavity to the rectum, play very important role in digesting the food, absorbing the nutrients, and throwing 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 aging 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 2.1.

Table 2.1: Physiological and Structural Changes Leading to Alterations in Diet

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.

In addition to the changes mentioned in Table 2.1 other physiological changes occur needing dietary alterations.

The muscle mass in the body gets reduced with age and the amount of dietary protein in daily diet is less. The bones gradually lose their density, a condition known as Osteoporosis. This is basically due to calcium loss from the bones. Adequate amount of calcium is necessary in the daily diet. Milk and milk products are good sources of calcium in elderly diet.

2.3 SIMPLE RULES FOR FORMULATING DIET FOR ELDERLY INDIVIDUALS

You will learn in detail how to advice and plan diets for elderly in the practical Course 3, Block 3, Unit 1 of this course. However rules presented here are the basic principles for formulating the diet for an elderly.

- 1) Instead of taking two major meals a day, the elderly person should be encouraged to have smaller amount of foods 3 or 4 times a day. Usually, the day-time meal should be a full meal and the night meal should be a light meal. Since aging is a gradual process, the desired meal pattern should be a gradual one.
- 2) The preference of most elderly for soups and soft mashy diet should not be encouraged and soft nutrition foods which need chewing should be given soft fruits should be given in place of fruit juices.

- 3) Care should be taken to encourage the elderly to take foods which contain some fibre like the vegetables and whole fruits. Instead of taking refined cereals like refined wheat flour (maida) and white bread, "atta" and brown bread should be consumed. The fibres are extremely useful in maintaining motility of the intestinal tract to prevent constipation and flatulence as well as regulating the absorption of certain nutrients to prevent several diet related diseases.
- 4) Due to the reduction of several digestive enzymes, starting with enzymes in the saliva, early digestible foods should be components of daily diet. Every individual has experience of "which foods suit them and which cause discomfort". In general, fried fatty foods are difficult to digest and produce undesirable impact on the body e.g. raising the level of blood cholesterol and triglycerides, which result in arteriosclerotic changes in blood vessels resulting in coronary artery diseases and strokes.

Four Simple Rules for Elderly Diet

- Advise the elderly individuals not to take two heavy meals a day. Divide the daily food intake into 3 to 4 small meals.
- Advise them not to take only liquids milk, soup, liquid Khichri. Make them eat foods like, fruits, vegetables, which needs some chewing.
- Advise them to take foods containing fibres like coarse cereals and vegetables.
- Avoid fatty foods especially fried foods.

Check Your Progress 1

1) Would you advice the elderly individuals to continue the same dietary pattern as in adult age? They would usually insist that they are used to this pattern. Why this is not correct?

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2) Fatty foods and fried snacks are very palatable. What advice would you give to older persons? Why these foods are harmful?

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2.4 ENERGY NEEDS OF AGING INDIVIDUALS

With the advance of age, the metabolism of the body, becomes reduced and as a result the total amount of food supplying energy to the body even for basic function of the body, which is known as "Basal Metabolism" decreases with age, should also be reduced.

In addition to this, all elderly individuals restrict their physical activity and thus the energy need would also be less. An adult person with normal activity, as in office work, will need

about 2200 kCal, while an elderly individual, staying at home and sitting or lying on bed a major portion of the day time, will need about 1600-1800 kCal.

In general, the appetite gets reduced with reduced physical activity but the tendency is to continue with the same diet.

The overall result is an excess of calorie intake as compared to energy or calorie output.

The appetite of old person very commonly decreases with age. The major reasons are decreasing physical activity, decreasing interest in foods and lack of palatable food preparations for dependence on others.

2.5 INCREASING BODY WEIGHT

The body weight of elderly individuals should be taken at intervals so that any tendency to over-weight (obesity) should be controlled. Obesity in elderly is dangerous because it leads to the development of chronic diet-related degenerative diseases like hypertension, coronary heart diseases and diabetes which are the major killers of the elderly individuals.

All elderly individuals should be advised to keep to body weight slightly below the desired level as prescribed by the doctors or the health workers. Special care should be taken to avoid or restrict those foods which are energy rich like sugar, sweet foods like pastries, butter, ghee and all fried foods. At the same time, look for nutritional deficiencies in elderly individuals, which are very common due to inappropriate diet. Nutritional anaemia due to iron/folate deficiency, bleeding gums due to vitamin C deficiency, angular stomatitis and glonitis due to riboflavin deficiency are very common in elderly individuals. When necessary, these should be corrected by nutrient supplements.

Dangers of Over-weight Obesity in Old Age

- Obesity is a metabolic disease
- Mortality in obese old individuals is much higher than lean aged individuals
- Obesity leads to other degenerative diseases like high blood pressure, diabetics, coronary artery diseases, which are the common killers of older persons

Check Your Progress 2

Why being over-weight in elderly individuals is dangerous for his/her health?

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2.6 DIET-RELATED DEGENERATIVE DISEASES IN ELDERLY

You have first learned that aging is a progressive biological process causing considerable changes in the body structure and associated with declining function. However, this is not a disease and is thus regarded as physiological aging. On the other hand, when diet-related degenerative diseases develop in aged individuals, the condition is then regarded as pathological aging. Old age morbidity and mortality is mostly due to pathological aging.

You have also learned that obesity (excessive deposition of fat in the body) leads to other degenerative diseases like diabetes, high blood pressure, coronary heart diseases, each of them being “killers of elderly individuals”. All elderly individuals and family care-givers should be advised that there are certain foods which very commonly lead to these degenerative diseases in the elderly individuals.

You have already learned that obesity is a metabolic disease and hence foods which are rich in calories like sugar and sweets, carbohydrate rich vegetables like potatoes, fats and fried foods should be avoided as far as possible.

Similarly, diet for older persons should not contain foods which are rich in saturated fats like animal flesh food like mutton and beef and dairy products like egg, butter and cheese. These foods produce a condition known as atherosclerosis of blood vessels, the walls of which become rigid and inelastic and its inner smooth lining becomes rough on which cholesterol might be deposited as “plaques”. Foods containing cholesterol like egg, liver, cheese are harmful because they lead to the formation of such plaques on the already sclerosed blood vessel walls which ultimately leads to thrombosis by the blockage of small vessels in heart (coronary thrombosis) and brain (cerebral thrombosis), commonly known as “stroke”.

Diet-Related Degenerative Diseases are Worst Enemies of Older Persons

- **Obesity, diabetes, high blood pressure, coronary artery diseases and ‘strokes’ in brain are the major killers of them**
- **Controlling diet and physical activity are two most powerful measures to control such conditions**

Check Your Progress 3

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What diet manipulation steps you will advise the elderly and their care-givers to prevent physiological aging going into pathological aging?

2.7 PHYSICAL ACTIVITY AND AGING

You have already learned about the dangers of excessive calorie consumption which leads to obesity which in turn leads to degenerative diseases like diabetes, coronary and cerebrovascular disorders. You know that restriction of calorie-rich foods like sugar, sweets and fatty foods is one way of preventing obesity. The other 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, is a condition of the long bones which become less dense through lack of calcium and is 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.

2.8 VALUE OF ANTI-OXIDANTS IN FOOD

You must also remember that recent nutritional studies with elderly individuals and with individuals with chronic degenerative disorders have revealed that there are certain vitamins and minerals present in foods, which in addition to their specific role in the body perform another type of protective action. These are known as anti-oxidants.

During the metabolic process in the body, which is going on throughout the day and night, a group of chemical compounds is formed continuously which are known as “free radicals”. These are harmful compounds and produce damages in various tissues and organs in the

body as well as accelerate the aging process. There are certain vitamins like vitamin A, vitamin C and vitamin E which are extremely beneficial in acting as anti-oxidants. Similarly, there are minerals like iron, selenium and zinc which also have such protective action. Their major function is to neutralize the harmful actions of "free radicals".

In addition to these vitamins and minerals, there are certain foods and spices which contain chemical substances which also act as powerful anti-oxidants. Onion, turmeric, olive, tea and soyabean are examples of such foods which contain anti-oxidants and which have been recently identified to have such protective action. Many coloured fruits and vegetables contain chemical compounds of various types with such protective action. Tomato has lycopene which has similar protective action. Many leafy vegetables have such anti-oxidants.

In general, the elderly individuals should be encouraged to take leafy vegetables and fruits which can be eaten as fruits or as salads. Light cooking with small or moderate amount of spices is another useful advice.

Value of Anti-Oxidants in Aging Individuals

Many foods and spices contain vitamins, minerals, flavonoids and other chemical compounds, which are known as anti-oxidants and which protect the body from various disorders common in aging and which are caused by oxygen molecule based chemical compounds known as "Free-radicals". Elderly individuals should encouraged to consume such foods.

List of foods containing anti-oxidants advice to use them generously in diet of elderly individuals:

- Citrous fruits like lime, lemon and orange.
- Coloured fruits and vegetables like carrot, papaya, tomato.
- Leafy vegetables, like spinach, cabbage.
- Onion, ginger and turmeric.

2.9 WATER AND AGING

An adult has 75 per cent of its body weight consisting of water whereas an elderly individual has only 55-60 per cent of the body weight as water. The body of an old person is thus, slightly dehydrated. This is one reason why the skin on body and face look so dry. Elderly individuals are vulnerable to heat stroke and dehydration. All elderly individuals should be encouraged to take as much of water and liquid drinks like any beverage or juices as much as possible with a general guideline that 8 glasses of water should be taken daily.

Remember that the thirst centre of the elderly in the brain gets gradually atrophied and so the elderly do not feel thirsty. It is the responsibility of the care-giver to encourage them to take adequate amounts of fluids every day.

2.10 LET US SUM UP

Adequate quantity and quality of food is the basic foundation of life. Foods have various functions and not all foods have the same function.

Daily diet will have to have different types of foods according to the major functions that are needed by the body and these differ according to the age and physiological status of the individual. Diets for infants, young children, adolescents, pregnant and lactating women are totally different from each other. Similarly, diet for elderly individuals has to be different since the body structure and biological functions are different from that of an adult and these differences increase with age. In general, an elderly individual eats less amount of food and

of a different pattern consisting of fluids and soft mashy foods. Most often, they have nutritional deficiencies.

The nutritional needs of elderly individuals are less than those of an adult. The daily diet should also have a different pattern and preferably smaller in quantity and more in number. Energy intake restriction should be strictly followed. Obesity in old persons can lead to various degenerative disorders which are major killers in old age. There are many foods which contain chemical compounds known as antioxidants, which neutralise the deleterious effect of another group of chemical compounds known as "Free-radicals", produced in the body during normal metabolism. Elderly should be encouraged to consume anti-oxidant containing foods.

2.11 KEY WORDS

Antioxidants	:	Chemical compounds which protect the body from harmful effects of free-radicals produced during metabolic process in the body.
Obesity	:	Excessive deposition of fat in the body.
Stroke	:	Thrombosis by the blockage of small vessels in heart and brain.

2.12 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

- 1) The elderly individuals should be encouraged to take 3-4 meals in a day instead of their routine 2 meals. The quantity taken in their meals should be less than they are accustomed in adulthood. With aging the stomach gets smaller in size and there is reduction in gastric enzymes. Big meals can cause gastric discomfort and digestive disturbance.
- 2) Generally fatty foods are difficult to digest and cause undesirable effects on the body, like raising the level of blood cholesterol and triglycerides. Therefore the elderly should be advised to avoid such foods as much as possible.

Check Your Progress 2

Overweight or obesity in older age is dangerous since it can lead to development of chronic diet-related degenerative diseases like hypertension, coronary heart diseases and diabetes.

Check Your Progress 3

The diet manipulation steps to be advised are:

- a) Foods rich in calories like sugar and sweets, carbohydrate rich vegetables like potatoes, fats and fried food should be avoided as they increase chances of obesity.
- b) Foods rich in saturated fats like animal flesh food, dairy products like egg, butter and cheese should be avoided since they increase chances of atherosclerosis.

2.13 FURTHER READING

Fanci, Braunwald, Isselbacher (eds.), *Harrison's Principles of Internal Medicine*, 14th edition, international edition, MacGraw Hill Publisher, 1998.