UNIT 8

Health and Hygiene-Food for Living

Learning Objectives

EY3BH7

This unit will help the students to

- understand the classification of nutrients
- gain knowledge on the intake of balanced diet and the significance of food
- list the common deficiency disorders, their causes, symptoms and recommended food sources
- gain knowledge about different methods of food preservation
- identify the adulterants in food
- explain the role of different food quality certifying agents of our country
- analyze the classes of food
- evaluate the importance of a balanced diet
- put into practice the healthy habit of eating

Introduction

Food is the basic necessity of life. Food is defined as "any substance (of either plant or animal origin) consumed to provide nutritional support for an organism". It contains essential nutrients like carbohydrates, proteins, fats, vitamins and minerals that help for normal growth, provide energy, repairs the worn out tissues and protects us from diseases. The term nutrients refers to the compounds which give us energy, and act as building blocks for tissues and protect us from diseases.

8.1 Classes of Nutrients

Nutrients are classified into six major groups as follows

- Carbohydrates
- Proteins
- Fats
- Vitamins
- Minerals
- Water

8.1.1 Carbohydrates

Carbohydrates are organic compounds composed of carbon, hydrogen, and oxygen in a ratio of 1:2:1. Carbohydrates are the chief source of energy. Edible sugar, starch, cellulose

More to Know

The major dietary carbohydrates

Class of carbohydrates	Components
Monosaccharides	Glucose, fructose, galactose
Disaccharides	Sucrose, lactose, maltose
Polysaccharides	Amylose, amylopectin, starch
	cellulose, hemicellulose, glycogen

are few examples for carbohydrates. Glucose is a monosaccharide, edible sugar is a disaccharide and cellulose in vegetables is a polysaccharide.

Sucrose is found in honey, sugarcane and fruits. Starch is found in rice, potatoes and bread. Glycogen is stored in our liver and muscles. Plant cell wall is made up of cellulose and other complex organic compounds.

8.1.2 Proteins

Proteins are essential nutrients for the human body. They are one of the building blocks of body tissue, and can also serve as a fuel source. As a fuel, proteins provide maximum energy than carbohydrates which provide 4 kcal (17 kJ) per gram and lipids which provide 9 kcal (37 kJ) per gram. The most important aspect and defining characteristic of protein from a nutritional standpoint is its amino acid composition.

Proteins are polypeptide chains made of amino acids linked together by peptide bonds. During the process of digestion, proteins are broken down in the stomach and small intestine to smaller polypeptide by action of proteases. This is crucial for the absorption of the essential amino acids that cannot be biosynthesized by the body.

There are nine essential amino acids (EAA) which humans must obtain from their diet in order to prevent protein-energy malnutrition. They are phenylalanine, valine, threonine, tryptophan, methionine, leucine, isoleucine, lysine and histidine.

8.1.3 Fats

Fats also known as triglycerides which are esters of free fatty acid chains and glycerol. Fat is an important foodstuff for many forms of life and serve in both structural and metabolic functions. They are a necessary part of the diet of most heterotrophs (including humans). Lipases are enzymes involved in the break down of fats in the small intestine during the process of digestion .

Essential fatty acids cannot be synthesized in the body and provided through diet. There are two essential fatty acids (EFAs) in human nutrition: alpha-linolenic acid (omega-3 fatty acid) and linoleic acid (omega-6 fatty acid).

8.1.4 Vitamins

Vitamins are vital nutrients, required in minute amounts to perform special functions to maintain a healthy body. An organic chemical compound (or related set of compounds) is called a vitamin when the organism cannot synthesize the compound in sufficient quantities, and it must be obtained through the diet.

EYC7XU

Do you know?

Food source	Lysine (mg/gm protein)	Threonine (mg/gm protein)	Tryptophan (mg/gm protein)	Sulfur-containing amino acids (mg/gm protein)
Legumes	64	38	12	25
Cereals and whole grains	31	32	12	37
Nuts and seeds	45	36	17	46
Fruits	45	29	11	27
Animal	85	44	12	38
Protein source with highest density of respective amino acid.				
Protein source with lowest density of respective amino acid.				

8.1.5 Mineral nutrients

In the context of nutrition, a mineral is a chemical element required as an essential nutrient by organisms to perform various functions necessary for life. Minerals originate in the earth and cannot be made by living organisms. Minerals are very important to maintain the physiological processes in our body. They are the constituents of teeth, bones, tissues, blood, muscle and nerve cells.

More to Know

- Dr. Funk introduced the term vitamin. Vitamin A was given the first letter of the alphabet, as it was the first to be discovered.
- Vitamin D improves bone strength by helping body to absorb calcium.
- Iron from meat (heme iron) and plant sources (non-heme iron) are absorbed by the body differentially. While the iron in meat protein is readily absorbed, non-heme iron requires Vitamin C for absorption.

How Vitamin D is synthesized by our skin?

Human skin can synthesize Vitamin D when exposed to sunlight (especially early morning). When the sun rays falls on the skin dehydro cholesterol is converted into Vitamin D. Hence, Vitamin D is called as **"Sunshine vitamin"**

The five major minerals in the human body are calcium, phosphorus, potassium, sodium and magnesium. All of the remaining elements in the human body are called "trace elements", such as sulfur, iron, chlorine, cobalt, copper, zinc, manganese, molybdenum, iodine and selenium.

8.1.6 Water

Water is vital as a solvent in which many of the body's solutes dissolve and also an essential part of many metabolic processes within the body. Metabolism include two process namely anabolism and catabolism. In anabolism, water is removed from molecules (through energy requiring

Vitamins, their sources, deficiency disorders and symptoms

Vitamins	Sources	Deficiency disorders	Symptoms
		Fat soluble vitamins	
Vitamin A (Retinol)	Carrot, papaya, leafy vegetables, fish liver oil, egg yolk, liver, dairy products	Xerophthalmia Nyctalopia (Night blindness)	Dryness of Cornea Unable to see in the night (dim light) Scaly skin
Vitamin D (Calciferol)	Egg, liver, dairy products, Fish, synthesized by the skin in sunlight	Rickets (in children)	Bow legs, defective ribs, development of pigeon chest
Vitamin E (Tocopherol)	Whole wheat, meat, vegetable oil, milk	Sterility in rats, Reproductive abnormalities	Sterility
Vitamin K (Derivative of Quinone)	Leafy vegetables, soyabeans, milk	Blood clotting is prevented	Excessive bleeding due to delayed blood clotting
		Water soluble vitamins	
Vitamin B1 (Thiamine)	Whole grains, yeast, eggs, liver, sprouted pulses	Beriberi	Degenerative changes in the nerves, muscles become weak, paralysis
Vitamin B2 (Riboflavin)	Milk, eggs, liver, green vegetables, whole grains	Ariboflavinosis (Cheilosis)	Irritation in eyes, dry skin, inflammation of lips, fissures in the corners of the mouth
Vitamin B3 (Niacin)	Milk, eggs, liver, lean meat, ground nuts, bran	Pellagra	Inflammation of skin, loss of memory, diarrhoea
Vitamin B6 (Pyridoxine)	Meat, fish, eggs, germs of grains and cereals, rice, polishings	Dermatitis	Scaly skin, nerve disorders
Vitamin B12 (Cyanocobalamine)	Milk, meat, liver, pulses, cereals, fish	Pernicious anaemia	Decrease in red blood cell production, degeneration of spinal cord
Vitamin C (Ascorbic acid)	Leafy vegetables, sprouts, citrus fruits like goose berry (Amala), lemon, orange	Scurvy	Swollen and bleeding gums, delay in healing of wounds, Teeth and bones malformed

enzymatic chemical reactions) in order to synthesize larger molecules (e.g. starch, triglycerides and proteins). In catabolism, water is used to break bonds in order to generate smaller molecules (e.g. glucose, fatty acids and amino acids to be used as fuels for energy use or other purposes). Without water, these particular metabolic processes could not exist.

8.2 A Case Study

Rani, of class IX, fainted during the morning assembly. When the teacher enquired, she replied that she had skipped her breakfast. It was also found that she has a regular habit of skipping breakfast in spite of her mother's advice.

Think

- Do you think by skipping your breakfast, you can concentrate on your studies?

Discuss in classroom: What are the health implications of skipping meals?

Do you know what happens when your diet lacks any of these essential nutrients?

Absence of certain nutrients in our daily diet over a long period of time leads to deficiency diseases. This condition is referred to as Malnutrition.

Let us study some common deficiency diseases

8.3 Protein Energy Malnutrition (PEM)

Protein is essential for growth and repair of body cells and tissues. Deficiency of proteins leads to weakness but its severe conditions causes diseases like:

1. Kwashiorkar
2. Marasmus

Kwashiorkar

It is a condition of severe protein deficiency. It affects children between 1-5 years of age, whose diet mainly consists of carbohydrates but poor in proteins.

Marasmus

It usually affects infants below the age of one year when the diet is poor in carbohydrates, fats and proteins. Look at the pictures of these children in picture 1 and 3. What differences can you observe in terms of growth, weight and appearance when compared to healthy children in picture 2?

Kwashiorkar condition

Healthy Children

Marasmus condition

Recommended nutritional requirements for a child

Nutrients	Daily requirements (grams)
Carbohydrates	150-200
Proteins	40
Lipids/fats	35

October 21st is declared as Global Iodine Deficiency Day.

Goitre:

It is a swelling of the region below the neck due to the enlargement of thyroid gland. It is caused due to iodine deficiency.

8.4 Minerals - Functions and Deficiency Diseases

Minerals, their sources, functions and deficiency diseases

Minerals	Sources	Functions	Diseases
		Macro nutrients	
Calcium	Dairy foods, beans, cabbage, eggs, fish	Constitution of bone, enamel of teeth, clotting of blood and controls muscle contraction	Bone deformities, poor skeletal growth, osteoporosis in adults.
Sodium	Table salt	maintains fluid balance and involved in neurotransmission	Muscular cramps, nerve impulses do not get transmitted.
Potassium	Banana, sweet potato, nuts, whole grains, citrus fruits	Regulates nerve and muscle activity	Muscular fatigue, nerve impulses do not get transmitted.
		Micro nutrients	
Iron	Spinach, dates, greens, broccoli, whole cereals, nuts, fish, liver	Important component of haemoglobin	Anaemia
Iodine	Milk, Seafood, Table salt	Formation of thyroid hormones	Goitre

8.5 Vitaminosis

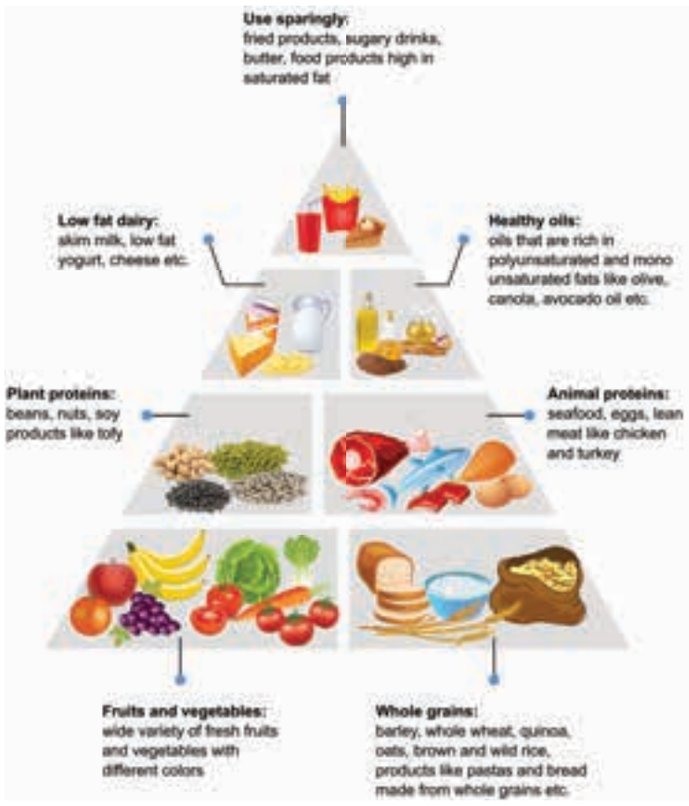
Any disease caused by the presence of excess of vitamin is called as **Vitaminosis**. **Hyper vitaminosis** is a condition of abnormally high storage of vitamins which can lead to toxic symptoms. **For Example:** An excess of Vitamin A is called Hyper Vitaminosis A.

How to overcome these deficiency diseases?

A diet containing essential nutrients in right proportion (**balanced diet**) is required for normal growth and development and to prevent malnutrition.

Food Pyramid

The food pyramid acts as a nutrition guide to select the types and proportion of food for good health. The food items at the top of the pyramid such as fat, and oil should be consumed in less quantity when compared to the food items at the bottom of the pyramid.



Activity 1

Prepare a balanced diet chart for a day to meet your nutritional requirements.

a. Breakfast _____
b. Midmorning _____
c. Lunch _____
d. Snacks _____
e. Dinner _____

Visit your kitchen. With the help of your mother note down the food items that are kept in dry condition and food items that are stored in fresh condition.

Observe and discuss

Keep a tomato and a potato at room temperature for a week.

1. What do you observe?

   Tomato showing signs of spoilage while potato remains unchanged

2. Can you guess why?

   The moisture content in tomato promotes the growth of microorganisms which start decaying it.

3. What do you infer from this?

   Every food has a different shelf life. The shelf life of potato is longer than that of tomato at room temperature.

Food spoilage

Food spoilage is an undesirable change in the food's normal state and is not suitable for human consumption. Signs of food spoilage may include a change in appearance, colour, texture, odour and taste.

Factors responsible for Food Spoilage:

Food gets spoiled due to two reasons

- Internal factors (spoilage from within)
- External factors (spoilage from outside)

Internal factors which include enzymatic activities and moisture content of the food.

External factors like adulterants in food, contaminated utensils and equipment, unhygienic cooking area, lack of storage facilities and poor personal hygiene may allow pathogenic microorganisms to cause food spoilage.

How to avoid food from being spoiled?

Food Preservation is the process of prevention from decay or spoilage of food, by storing in a condition fit for future use. Food is preserved to

- increase the shelf life of food
- retain the colour, texture, flavour and nutritive value
- increase food supply
- decrease wastage of food
- add variety to the food

8.6 Methods of Food Preservation

8.6.1 Dehydration/Drying

Drying or dehydration is the process of removal of water/moisture content in the food. It can be done either by sun-drying, (e.g. cereals, fish) or vacuum drying (e.g. milk powder, cheese powder) or hot air drying (e.g. grapes, dry fruits, potato flakes). Drying inhibits the growth of microorganism such as bacteria, yeasts and moulds.

Dried neem leaves, turmeric are used to store food grains in our home to protect the grains from insects and beetles.

8.6.2 Smoking

In this process, food products like meat and fish are exposed to smoke. The drying action of the smoke tends to preserve the food.

8.6.3 Irradiation

Food irradiation is the process of exposing food to optimum levels of ionizing

Why do dry grapes (raisins) not spoil at room temperature when fresh grape does?

radiations like x-rays, gamma rays or UV rays to kill harmful bacteria and pests and to preserve its freshness. This process is sometimes called 'cold pasteurization' as the product is not heated. Irradiation does not destroy the taste or nutritive value of food. The shelf life of onions and potatoes increases when exposed to radiation.

8.6.4 Use of inert gas

Nitrogen gas is filled in air-tight packets of potato wafers and other food products thus preventing the growth of fungus and insects in them.

8.6.5 Cold storage

The process of storing the perishable foods such as vegetables, fruits and fruit products, milk and milk products etc. at low temperature in a refrigerator is called cold storage. Preserving the food at low temperature slows down the biological and chemical reactions in food products and prevents its spoilage.

8.6.6 Freezing

Freezing is one of the widely used methods of food preservation. This process involves storing the food below 0^0C at which microorganisms cannot grow, chemical reactions are reduced and metabolic reactions are also delayed.

Bananas are not kept in refrigerator why?

Bananas are best stored at room temperature. When it is kept in a refrigerator, the enzyme responsible for ripening becomes inactive. In addition, the enzyme responsible for browning and cell damage becomes more active thereby causing the skin colour change from yellow to dark brown.

Deep freezing is a method of food preservation where the food materials are kept inside a cold room in a temperature range of -23^0C to -30^0C. Seeds are preserved at sub - zero temperature.

8.6.7 Pasteurization

Pasteurization is a process of food preservation, which is named after the scientist Louis Pasteur. This process involves boiling of milk to a temperature of 63°C for about 30 minutes and suddenly cooling to destroy the microbes present in the milk. Pasteurisation helps in avoiding spoilage of milk.

Simple representation of the process of pasteurisation of milk

Know your scientist

Louis Pasteur (1822 – 1895)

French chemist and microbiologist, was the founder of microbiology. He discovered that microorganisms cause fermentation and diseases. He invented the process of pasteurisation and developed vaccination against rabies and anthrax.

Methylene Dye Reduction Test - It is widely used in milk processing units to assess the microbial quality of raw and pasteurised milk. The quality of the milk is considered superior or inferior based on the time taken by the milk to decolourize after the addition of Methylene blue dye solution to it. Sooner the decolourization, more inferior is the bacteriological quality of milk and requires further processing.

8.6.8 Canning

In this method of food preservation, most vegetables, fruits, meat and dairy products, fruit juices and some ready-to-eat foods are processed and stored in a clean, steamed air tight containers under pressure and then sealed. It is then subjected to high temperature and cooled to destroy all microbes.

More to Know

- Operation Flood, launched in 1970 by National Dairy Development Board, started the White Revolution in India and transformed our country from a milk deficient nation into the World's largest producer of milk and milk products. Dr. Verges Kurien, the founder of "Anand Milk Union Limited"(AMUL) was the brain behind the success of the programme.

8.6.9 Addition of preservatives

Food can be preserved by adding natural and synthetic preservatives.

A) Natural preservatives

Some naturally available materials like salt, sugar and oil are used as food preservatives.

1. **Addition of salt**: It is one of the oldest methods of preserving food. Addition of salt removes the moisture content in the food by the process of osmosis.

This prevents the growth of bacteria and reduces the activity of microbial enzymes. Meat, fish, gooseberry, lemon and raw mangoes are preserved by salting. Salt is also used as a preservative in pickles, canned foods etc.

2. **Addition of sugar**: Sugar/Honey is added as a preservative to increase the shelf life of fruits and fruit products like jams, jellies, squash, etc. The hygroscopic nature of sugar/ honey helps in reducing the water content of food and also minimizing the process of oxidation in fruits.
3. **Addition of oil**: Addition of oil in pickles prevents the contact of air with food. Hence microorganisms cannot grow and spoil the food.

DO YOU KNOW?

In addition to microbiological and chemical contamination, preservatives like excess salt, sugar and oil also make food unsafe for consumption and are linked with non-communicable diseases such as diabetes, obesity and heart diseases.

Think

- Why is a layer of oil seen above the vegetables in pickles?

B. Synthetic preservatives

Synthetic food preservatives like sodium benzoate, citric acid, vinegar, sodium meta bisulphate and potassium bisulphate are added to food products like sauces, jams, jellies, packed foods and ready- to-eat foods. These preservatives delay the microbial growth and keep the food safe for long duration.

Activity 2

Bring food items like rice, black gram, milk packet, dry fish, pickle, apple, tomato, brinjal, jam, dry grapes and sprouted grains. Now classify and display these food items separately based on their storage methods.

S.no	Cold storage	Dry storage	Preserva-tives	Pasteuri-sation

More to Know

- October 16th is World Food Day. It emphasizes on food safety and avoid food wastage.

8.7 Adulteration

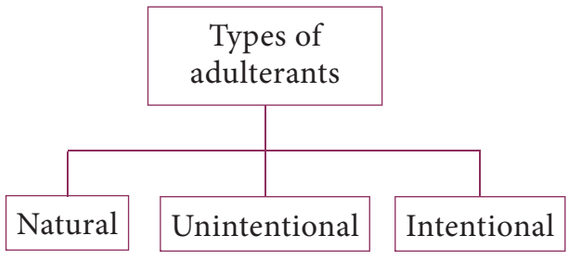
Observe the picture

What do you think the man in the picture is doing?

Food safety is becoming a major concern in these days. Food is contaminated or adulterated from production to consumption for financial gain or due to ignorance, carelessness and poor hygienic conditions during processing, storing and marketing. Adulteration is defined as "the addition or subtraction of any substance to or from food, so that the natural composition and the quality of food substance is affected."

Some of the common adulterated foods are milk and milk products, cereals, pulses, coffee powder, tea powder, turmeric powder, saffron, confectionary, non-alcoholic beverages, spices, edible oils, meat, poultry products etc. The adulterants in food can be classified in three categories based on whether they occur naturally in food, or added intentionally or unintentionally.

Types of adulterants



1. Natural adulterants

Natural adulterants are those chemicals, organic compounds or radicals that are naturally present in food. They include,

a. Naturally occurring toxic substances in certain poisonous mushrooms, Prussic acid in seeds of apples, cherry and peach pits, marine toxins, fish oil poisoning etc.,

b. Environmental contaminants like pollutants in air, water and land.

2. Incidental/ unintentionally added adulterants

These types of adulterants are added unknowingly due to ignorance or carelessness during food handling and packaging. It includes

a. Pesticide residues

b. Droppings of rodents, insects, rodent bites and larva in food during its storage

c. Microbial contamination due to the presence of pathogens like *Escherichia coli*, *Salmonella* in fruits, vegetables, ready-to-eat meat and poultry products

3. Intentionally added adulterants

These adulterants are added intentionally for financial gain and have serious impact on the health of the consumers. These types of adulterants include:

a. Additives and preservatives like vinegar, citric acid, sodium bicarbonate (baking soda), hydrogen peroxide in milk, modified food starch, food flavours, synthetic preservatives and artificial sweeteners.

SOURCES OF FOOD CONTAMINATION

HOW TO DETECT FOOD ADULTERATION?

BANANAS
ADULTERANT
Calcium carbide (CaC), to ripen the fruit

HOW TO DETECT
If the stem of banana appears green, instead of a shiny yellow, it has probably been ripened by CaC

HEALTH EFFECTS
Carcinogenic, can harm digestive system and liver

APPLES
ADULTERANT
Wax coating

HOW TO DETECT
The apple will appear very glossy and shiny. It could have slight scratches and you may notice a thin layer peeling off, which is the wax

HEALTH EFFECTS
Can harm the digestive system. Can also lead to ulcers and gastric problems

MANGOES
ADULTERANT
CaC, to ripen the fruit

HOW TO DETECT
If the colour of the mango is uniform, or if you find dark green patches around the mangoes on the surface where they are kept

HEALTH EFFECTS
Can lead to headache, dizziness, nausea and neurological problems.

GREEN VEGETABLES
bitter gourd, green chilli
ADULTERANT:Malachite Green

HOW TO DETECT
Take a small portion and place it on moistened white blotting paper. The impression of colour on paper shows the use of adulterant.

HEALTH EFFECTS
Carcinogenic if consumed over a long period of time.

COMMON SALT
ADULTERANT
White chalk

HOW TO DETECT
Stir a small amount of salt in water. If there is chalk, the solution will turn white and other insoluble impurities will settle

HEALTH EFFECTS
May lead to gastric problems.

CHILI POWDER
ADULTERANT
Brick powder

HOW TO DETECT
Add a small amount of chilli powder in water. The brick powder will settle and the pure chilli powder will float

HEALTH EFFECTS
Can cause loss of vision, respiratory and digestive problems

TEA LEAVES
ADULTERANT
Coal tar dye

HOW TO DETECT
Scatter sample on moistened blotting paper. Appearance of colour spots after minutes shows presence of adulterant

HEALTH EFFECTS
Carcinogenic

ICE CREAM
ADULTERANT
Washing powder

HOW TO DETECT
Take a sample and add drops of limejuice. If froth or bubbles develop on the sample, then it shows presence of washing powder

HEALTH EFFECTS
Can cause severe stomach and liver disorders

b. Chemicals like calcium carbide to ripen bananas and mangoes.

c. Non certified food colours containing chemicals like metallic lead are used to give colours to vegetables like green leafy vegetables, bitter gourd, green peas etc. These colours are added to give a fresh look to the vegetables.

d. Edible synthetic wax like shellac or carnauba wax is coated on fruits like apple, pear to give a shining appearance.

e. Growth hormones, steroids and antibiotics are administered as adulterants to vegetables, cattle, sheep and poultry for faster growth and to increase milk production in dairy cows.

Follow-up activity

Look at the picture and discuss the answer

- How these apples are different in their appearance?
- Why is it so?
- Which one is safe for consumption?

Consumption of these adulterated foods may lead to serious health issues like fever, diarrhoea, nausea, vomiting, gastrointestinal disorders, asthma, allergy, neurological disorder, skin allergies, immune suppression, kidney and liver failure, colon cancer and even birth defects.

Fruit flies are more attracted towards fruits that are naturally ripened.

Difference between naturally ripened fruit and artificially ripened fruit

Properties	Naturally ripened fruit	Artificially ripened fruit
Colour	Attractive, but not uniformly coloured	Uniformly coloured but very attractive
Aroma	Good	Mild
Firmness	Good	Fair to some extent
Taste	Sweet and pleasant	Though appears ripe, inner core is sour
Shelf life	Long	Short. Black blotches appear on fruit after two to three days

Activity 3

Test to identify the purity of milk.

Aim: To detect the presence of starch in milk.

Materiel required: Test tube, milk, iodine solution.

Procedure: Take 10ml of different warm milk samples in a test tube and add few drops of iodine solution to it.

Observation: Formation of blue colour indicates the presence of starch.

Some simple techniques used to detect adulterants at home

1. Milk: Place a drop of milk on a slanting polished surface. Pure milk flows slowly leaving a trail behind while the milk adulterated with water will flow fast without leaving a trail.
2. Honey: Dip a cotton wick in honey and light it with a match stick. Pure honey burns while adulterated honey with sugar solution gives a cracking sound.
3. Sugar: Dissolve sugar in water. If chalk powder is added as an adulterant, it will settle down.
4. Coffee powder: Sprinkle a few pinches of coffee powder in a glass of water. Coffee powder floats. If it is adulterated with tamarind powder it settles down.
5. Food grains: They have visible adulterants like marble, sand grit, stones, etc. These are removed by sorting, hand picking, washing etc.

Project

Project: Collect information on the methods of organic or non-chemical farming and its role in maintaining food quality.

Food quality control agencies of our Country

A slogan "**From farm to plate, make food safe**" was raised on World Health Day (7th April 2015) to promote and improve food safety.

Food should be pure, nutritious and free from any adulteration for proper maintenance of human health.

It is the duty of every government to make pure and safe food available to public in sufficient quantities. In 1954, the Indian government enacted the food law known as Prevention of Food Adulteration Act and the Prevention of Food Adulteration Rules in 1955 with the objective of ensuring pure and wholesome food to the consumers and protect them from fraudulent trade practices.

Minimum standards of quality for food and strict hygienic conditions for its sale are clearly outlined in the Act. Any food that does not conform to the minimum standards laid down in the Act is said to be adulterated. The Act also intends to penalise the dealers who are engaged in the production and sale of contaminated food substances. This Act is periodically amended based on requirements.

Quality control agencies such as

- ISI, AGMARK, FPO, FCI and other health departments enforce minimum standards for the consumer products.

FCI (Food Corporation of India) was set up in the year 1965 with the following objectives:

- Effective price support operations for safeguarding the interest of farmers.
- Distributing food grains throughout the country.

Food control agencies, their standardized mark and their role in food safety

	ISI (Indian Standards Institution) known as Bureau of Indian Standard (BIS)	Certifies industrial products like electrical appliances like switches, wiring cables, water heater, electric motor, kitchen appliances etc.
	AGMARK (Agricultural Marking)	Certifies agricultural and livestock products like cereals, essential oils, pulses, honey, butter etc.
	FPO (Fruit Process Order)	Certifies the fruit products like juice, jams, sauce, canned fruits and vegetables, pickles etc.,
	Food Safety and Standards Authority of India	Responsible for protecting and promoting the public health through regulation and supervision of food safety.

- Maintaining satisfactory levels of operational and buffer stock of food grains to ensure national security.
- Regulate the market price to provide food grains to consumers at reliable price.

A Case Study

Siddanth came back from school. He was feeling very hungry. His mother sent him to buy a packet of biscuits from a nearby shop. When his mother opened the packet, she

More to Know

The **Codex Alimentarius** (Latin for "Food Code") is a collection of internationally recognised standards, codes of practice, guidelines, and other recommendations relating to foods, food production and food safety. The Codex Alimentarius is recognized by the World Trade Organisation (WTO) as an International reference point for the resolution of disputes concerning food safety and consumer protection.

realized that it was not fresh. So she asked him to return the packet for a new one.

What do you think Siddanth should have observed before buying the biscuit packet?

Activity 4

Let each of the student bring any food packet (jam, juice, pickle, bread, biscuit, etc). Note down the details like name of the product, manufacturer's details, contents/ ingredients, net weight, Maximum Retail Price (MRP), date of manufacture, date of expiry/best before twelve months from the date of manufacture and standardized marks like ISI, AGMARK or FPO printed on the label for each of the items to create awareness

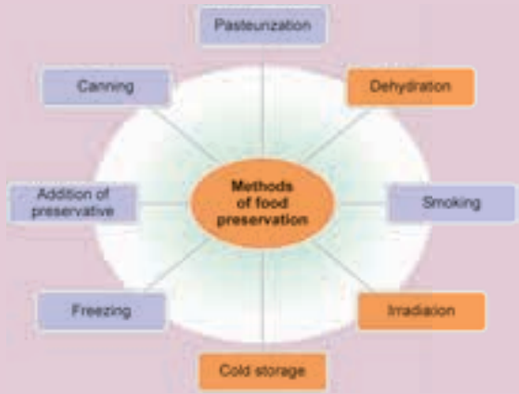
HOTS

Is it so?

- Cereal is the healthiest way to start the day
- Healthy means low fat.
- Bottle water is better than tap water

Activity 5

Look at the given mind map showing different methods of food preservation. Give one example for each of the following methods



Points to remember

- Food is necessary for normal growth and development of living organisms.
- Prolonged deficiency of certain nutrient causes deficiency diseases leading to Malnutrition.
- Drying, smoking, irradiation, refrigeration, freezing, pasteurization and canning are some of the methods of food preservation.
- Adulterants are undesirable substances added to the food against the Food Safety Standards.
- Prevention of Food Adulteration Act, 1954 laid down the minimum standards for consumer products.

GLOSSARY

1. **Fatigue** extreme tiredness due to mental or physical illness
2. **Hygroscopic** the property of absorbing moisture from the air
3. **Insomnia** loss of sleep
4. **Microbiology** branch of science that deals with the study of microorganisms
5. **Muscular cramps** sudden and involuntary contractions of one or more muscles
6. **Nutrients** substance that provide nourishment for normal growth and development
7. **Nerve impulse** electric signals that travels along a nerve fibre
8. **Neurotransmitter** chemical substance released at the end of a nerve fibre which transmits the nerve impulse to the next nerve fibre
9. **Nourishment** food that you need to grow and stay healthy
10. **Osteoporosis** a diseases which weakens the bones and makes it brittle
11. **Oxidation** loss of electrons
12. **Paralysis** loss of muscle function in any part of our body which can be either temporary or permanent
13. **Shelf life** time for which a food can be kept fresh
14. **Toxins** any poisonous substance produced by bacteria, animals or plants

ICT CORNER

Deficiency Diseases

Step 1. Type the following URL in the browser or scan the QR code from your mobile.

Step 2. A home of ICMR opens, Select **Nutri Guide** you can find various nutrients like Vitamins, Minerals Proteins.

Step 3. Now Click on the Vitamins and you can find different types of Vitamins.

Step 4. Click on any Vitamins button and a new screen will open with Vitamin chart with Biochemical, RDA, Dietary Sources Signs & Symptoms.

http://218.248.6.39/nutritionatlas/home.php

QR Code

EXERCISES

EYL3ZH

I. Choose the best answer

1. The nutrient required in trace amounts to accomplish various body functions is _____

a) Carbohydrate b) Protein c) Vitamin d) Fat

2. The physician who discovered that scurvy can be cured by ingestion of citrus fruits is _____
   a) James Lind
   b) Louis Pasteur
   c) Charles Darwin
   d) Isaac Newton

3. The sprouting of onion and potatoes can be delayed by the process of _____
   a) Freezing b) Irradiation
   c) Salting d) Canning

4. Food and Adulteration Act was enacted by Government of India in the year _____
   a) 1964 b) 1954
   c) 1950 d) 1963

5. An internal factor responsible for spoilage of food is _____
   a) Wax coating
   b) Contaminated utensils
   c) Moisture content in food
   d) Synthetic preservatives

II. Fill in the blanks

1. Deficiency diseases can be prevented by taking _____ diet.
2. The process of affecting the natural composition and the quality of food substance is known as _____
3. Vitamin D is called as _____ vitamin as it can be synthesised by the body from the rays of the sun.
4. Dehydration is based on the principle of removal of _____.
5. Do not purchase food beyond the date of _____
6. AGMARK is used to certify _____and_____ products in India.

III. Mention whether the following statements are true or false. If false, give the correct statements

1. Iron is required for the proper functioning of thyroid gland.
2. Vitamins are required in large quantities for normal functioning of the body -
3. Vitamin C is a water soluble Vitamin
4. Lack of adequate fats in diet may result in low body weight
5. ISI mark is mandatory to certify agricultual products.

IV. Match the following

A	B
1. Calcium	a. Muscular fatigue
2. Sodium	b. Anaemia
3. Potassium	c. Osteoporosis
4. Iron	d. Goitre
5. Iodine	e. Muscular cramps

V. Fill in the blanks with suitable answers

Vitamin	Rich source	Deficiency disease
Calciferol		Rickets
	Papaya	Night blindness
Ascorbic acid		
	Whole grains	Beriberi

VI. Unscramble the words in the brackets to complete the sentence

Salting is a process involving addition of ____ (aslt) removes the ____ (oitmsuer) content in the_____ (dofo) by the process of _____ (sosisom) and prevents the growth of_____ (artcaeib).

VII. Give abbreviations for the following food standards

i. ISI _____

ii. FPO _____

iii. AGMARK _____

iv. FCI _____

v. FSSAI _____

VIII. Assertion and Reason

Direction: In the following question, a statement of a Assertion is given and a corresponding Reason is given just below it. Of the statements given below, mark the correct answer as:

(a) If both Assertion and Reason are true and the Reason is the correct explanation of Assertion

(b) If both Assertion and Reason are true but Reason is not the correct explanation of Assertion

(c) If Assertion is true but Reason is false

(d) If both Assertion and Reason is false

1. Assertion: Haemoglobin contains iron.
   Reason: Iron deficiency leads to anaemia
2. Assertion: AGMARK is a quality control agency
   Reason: ISI is a symbol of quality

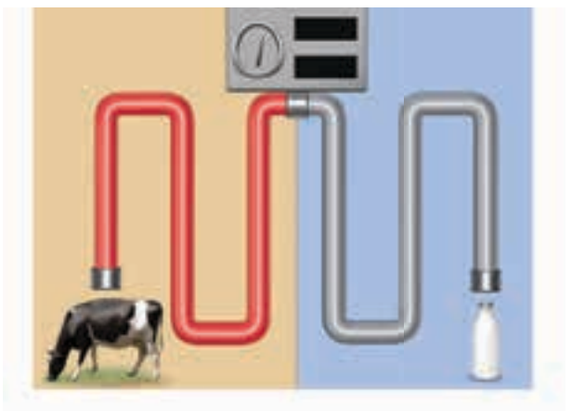
IX. Very short answers

1. Differentiate
   a) Kwashiorkar from Marasmus
   b) Macronutrients from micronutrients
2. Give reasons why salt is used as preservative in food.
3. What is an adulterant?
4. A doctor advices an adolescent girl who is suffering from anaemia to include more of leafy vegetables and dates in her diet. Why so?
5. Name any two naturally occuring toxic substances in food.
6. What factors are required for the absorption of Vitamin D from the food by the body?

X. Short answers

1. Write any one function of the following minerals
   a) Calcium b) Sodium
   c) Iron d) Iodine
2. Explain any two methods of food preservation.
3. Sanjana wants to buy a jam bottle in a grocery shop. What are the things she should observe on the label before purchasing it.
4. Give one reason for the following statements:
   a. Salt is added as a preservative in pickles_____
   b. We should not eat food items beyond the expiry date _____
   c. Deficiency of calcium in diet leads to poor skeletal growth _____
5. What are the effects of consuming adulterated food?

6. Look at the picture and answer the question that follows



a) Name the process involved in the given picture.

b) Which food is preserved by this process?

c) What is the temperature required for the above process?

XI. Detail answer

1. How are vitamins useful to us? Tabulate the sources, deficiency diseases and symptoms of fat soluble vitamins
2. Explain the role of food control agencies in India.

FURTHER REFERENCE

1. Swaminathan M (1995): "Food & Nutrition", The Bangalore Printing & publishing co ltd., Vol I, Second Edition, Bangalore.
2. Srilakshmi (1997): "Food Science", New Age International (P) Ltd, Publishers, Pune.
3. Mudambi .R. Sumathi & Rajagpal M.V (1983), "Foods & Nutrition", Willey Eastern Ltd, Second Edition, New Delhi.
4. Thangam.E.Philip(1965): Modern Cookery, Orient Longman, II edition. Vol II, Bombay.
5. Shubhangini A. Joshi,(1992)' "Nutrition and Dietetics" Tata Mc Grow- Hill publishing Company Ltd, New Delhi.
6. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai

WEBLIOGRAPHY

1. http://en.wikipedia.org >wiki> food preservation
2. https://en.m.wikipedia.org/wiki/louispasteur
3. http://pfa.delhigovt.nic.in
4. www.fao.org>fao-who-codexalimentarius