UNIT 5 : FOOD, NUTRITION AND BIOCHEMISTRY

UNIT STRUCTURE

5.1 Learning Objectives

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5.1 LEARNING OBJECTIVES

After going through this unit, you will able to-

- know about food
- get knowledge about the importance of food
- know about sorrces of different nutrients
- know about balanced diet
- know about requimenent of food according to age.

5.2 INTRODUCTION

Food is any substance consumed is provide nutritional support for an organism.

Food is a fundamental right of any living being. It gives energy to body to perform work properly. Food contains essential nutrients for body such as carbohydrates, fats. proteins, vitamins and minerals. All these nutrients are not available in all kinds of foods equally. So people should

be careful in choosing food stuffs. Because imbalance of these nutrients, excessiveness of nutrients or lack of nutrients may cause disease. So balanced diet is always advisable.

Foods can be catagorised as wholesome food and unwholesom food. Wholesome food and drinks having good colar, smell, taste and touch are pleasing to senses and condusive to health. If it is taken in accordance with the rules then it is useful for all living beings. It also provides fuel to the fire of digestion, promote mental as well as physical strength, complexion and clarity of sense organs and also gives proper energy to mind. So whoever takes proper diet he lives a long life and whoever do not take he gets premature death.

So persons should always be concerned about proper diet for a healthy living.

Nutrition is the science that interprets the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, health and disease of an organism.

Simply nutrition is the study of food at work in our bodies, our source for energy and the medium for which our nutrients can function.

A nutrient is a source of nourighment, a component of food, e.g. protein, carbohydrate, fat, vitamin, mineral, fibre and water.

Biochemistry is a branch of science which deals with the study of the structure and functions of the biomoleause such as the carbohydratis, proteins, acids, lipids etc which provide the structure of cells and perform many of the functions associated with life.

5.3 FOOD

It has been already mentioned that food is fundamental right for all living being. All the living to beings on earth depending on food because it gives energy for performing various functions in body. Foods are mainly obtained from animals and plants. Some of the living beings produce their food by themselves and some of them are depending on others.

Food supplies nutrition to the body for its growth and development. It also helps in repairing tissues. Because constans work couses ware and

tear of the body and finally body needs food to replace these lost tissues.

Food is also required in regaining energy. We spend lot of energy while working, i.e why we get tireg after doing work. Then we need food and rest to regain our lost energy.

Along with these food also protest our body from verious disease providing minerals, sales vitamins etc in the form of nutrient.

From this discussion it is clear that food is very essential part of our life.

5.3.1 Classification of Food

Food articles are classified from different aspects. Those classifications are–

(A) Classification by origin of food articles–

(i) Non vegetarian food

(ii) Vegetarian food.

(i) Non vegetarian food :

In non vegetarian food also there are so many varities like sea food, terrastrial, animals etc.

Charateristics of non vegatarian food–

- Non vegetarian foods are more rajasik and tamasik in nature.
- There are lots of protiens in non ven food
- Non veg food is naturally heavy to digest.
- Non veg food increases immunity of body in a very short time.
- Non veg food increases cholesteral in blood.
- In non veg food there is less fiber, so censtipation is common which may lead to colon cancer.

(ii) Vegetarian food :

Vegetarian food mainly incuedes vegetables, cereals, fruits etc.

Characteristics of vegetarian food–

- Vegetarian foods are sattvika innature.
- It has more of carbohydrates and vitamins but it has

comparativelly less protiens. But by taking balanced diet the incomplete protiens can be balanced.

- In veg food, there is lot of fiber hence people do not suffer from constipation.
- Veg food is comparatively less capable of increasing the immunity of the body.
- Veg food does not decay early, so we can preserve it for longtime.

(B) Classification of food by chemical composition–

(i) Protein
(ii) Fats
(iii) Carbohydrates
(iv) Minerals
(v) Vitamins

(i) Protein : Protein are important constituent of tissues and cells of the body. It plays an important role in repairing and maintenance of body tissue. Protien constitutes about twenty percent of the body weight in an adult.

Proteins are mainly found in milk, meat, eggs, cheese, fish, pulses, cereals, beans, nuts etc.

(ii) Fats : It is an important componant of diet and is a concentrated source of energy. It is two types viz– visible fats and invisible fats.

Fats are mainly found in ghee, butter, milk, eggs, meat, fish etc.

(iii) Carbohydrates : It is a major component of food. It is mainly available in milk, sugar, grain foods, roots, cereals etc.

(iv) Minerals : Minerals are chemical elements. It is available in milk, banana, papaya etc.

(v) Vitamins : Vitamins are organic substances present in small amounts in food. Source of vitamins are eggs, butter, milk, fish, meat, grean vegetables etc.

(C) Classification of food by nutritive, value.

(i) Cereals

(ii) Pulses

(iii) Milk

(iv) Vegetables

(v) Nuts and oil seeds

(vi) Fruits

(vii) Animal foods

(viii) Sugar and Jaggery

(ix) Mesceltaneous foods.

Except chese chassifications there is another kind of classification which is mentioned in Ayurveda.

In Caraka Samhita a principal Ayurvedic text Acarya Caraka classified food articles in twelve groups. Those are–

(i) Shuka Abhanya Varga

(ii) Shimbi Dhanya Varga

(iii) Mamsa Varga

(iv) Shaka Varga

(v) Phala Varga

(vi) Harita Varga

(vii) Madya Varga

(viii) Ambu Varga

(ix) Gorasa Varga

(x) Ikshu Varga

(xi) Kritanna Varga

(xii) Ahorayogi Varga.

Acarya Susreeta, father of surgery also mentioned these vargas in his sushruta Samhita. He also added some new vargas viz– Kanda Varga, Lavara Varga, Bhakshya Varga and Anupana Varga.

In Yogic texts also food has been discussed. According to Yogic texts there are three kinds of food viz–

(i) Sattvika food.

(ii) Rajasika food

(iii) Tamasika food.

In Srimadbhagavadgita also three kinds of food are mentioned those are Sattvika, Rajasika and Tamasika food.

5.3.2 Balanced Food

A balanced diet is that which provides all the nutrients in required amounts and proper proportions. Because different foods contain different amount of elements needed by our body for its growth, repair, energy and to protect itself from disease. These vital elements are called nutrients such as– carbohydrates, protein, fats, minerals and vitamins. No single food item can give all these necessary nutrients. So we must choose our food items according to the needs of our body. Because a balanced diet will not be some for every person. Generally a person doing lot of physical work will need more of fats and carbohydrates. A child needs more proteins than an old man. So we must follow the balanced diet. A balanced diet should include that food which can supply enough energy for each day activities. It should consist carbohydrates and lipids to provide energy for all the activities in the body. It should consist protein to build new tissues for growth and repair damaged tissues. It should consist vitamin also to prevent diseases and for normal healthy developments. It should contain mineral and water also. If a person follow this balanced diet then he requires no medicine and it he does not follow then no medicine can help him. So, balanced diet is always advisable.

5.3.3 Food according to age

Everybody needs food. But depending upon age, accupotion etc requirement of food and its quantity is different. Thats why diet for a child is not same to diet for an adult or an old man. Similarly diet for a labour man is different from that of a non labour man. So

we should be concerned about the required food for our body according to our age and occupation. So a brief description on this topic is given below–

(i) Food for infant :

In fetal life the baby recieves its nourishment from the mother through the placetra. After birth the baby gets its all nourishment from mother only through breast milk. Breast milk is the most natural food and ideal nourishment for the baby. Because breast milk is safe, clean, hygenic and available to the infant at correct temperature. It contains anti-microbial factors which provide considerable protection to the baby. It also promotes bond of love between mother and th baby.

Later supplementary food also can be given to the baby.

(ii) Food for a child :

The diet which is beneficial for a child is–

Cereals – Rice, red rice, wheat etc.

Pulses – Chana, masur dal, mung dal, dried peas.

Meat – Dear, goat, pigeon, chicken, fat of pig.

Vegetables – Practically all green vegetables.

Fruits – Amla, black grapes, grapes, mango, papaya.

Sweetners – Sugar cane juice and honey.

Milk – Milk of cow, buffalo, goat, ghee, buttermilk.

Spices – Ginger, garlic, cumin seeds.

Edible oil – Sesame and groundnut oil.

Water – Rain water, pure water.

(iii) Food for adult :

An adult needs wide range of nutrients to lead a healthy life. The nutrients include protien, fat, carbohydrate, vitamin and minerals. The foods which contain these nutrients are– cereals, pulses, nuts, oil seed, vegetables, fruit, milk and milk product and flesh food like fish, meat, poultry etc.

Excessive consumption of carbohydrates should be avoided. Sources rich in energy such as fats and alcohol should be restricted.

Food material which supplies empty calories should be reduced.

Recommendations for daily food intake for adult man is as follows–

Energy – 2500 – 3500 kcal / day

Protien – 60 gm / day

Vitamin A – 600 ug / day

Fat – 20 gm / day

Thiamine – 1.5 mg / day

Calcium – 400 mg / day

Riboflavin – 1.5 mg / day

Iron – 30 mg / day

Nicotinic acid – 2.0 mg / day

Pyridoxine – 2.0 mg / day

Vit. C – 40 mg / day

Folic acid – 100 mg / day

Vit, B_{12} – 1 ug / day.

A list of quantity of required food for different persons is given below–

Table 1: Balanced diet per day (in grams)

Food item	Men			Women					Children			Boys	Girls
	Sedentary work	Moderate work	Heavy work	Sedentary work	Moderate word	Heavy work	Pregnant (extra)	Lactation (extra)	1-3 yrs	4-6 yrs	7-9 yrs	10-12 yrs	10-12 yrs
Cereals	460	520	670	410	440	575	35	60	175	270	340	420	380
Pulses	40	50	60	40	45	50	15	30	35	35	40	45	45
Leafy vegetabels	40	40	40	100	100	100	-	-	40	50	50	50	50
Other vegetables	60	70	80	40	40	50	-	-	20	30	35	50	50
Roots and Tubers	50		80	50	50	60	-	-	10	20	5	30	30
Milk	150	200	250	100	150	200	100	100	300	250	250	250	250
Oil and Fat	20	20	20	20	20	20	10	25	25	25	25	22	22
Sugar or Jaggery	30	35	55	20	20	40	10	10	30	40	45	45	45
Fruits	60	60	60	60	60	60	-	-	60	60	60	60	60

Source: Indian Council of Medical Research.

5.4 NUTRITION

Nutrition is the most essential elements to be hcalthy and living a long life. Since the begining of the civilization people deal with food everyday and food has been a part of life. Without proper diet our body can not

carry the functions which is needed to perform. So proper nutrition is necessary for the body to function at optimal capacity.

Nutrition is the science that interprots the interaction of nutrients and other substances in food in relation to maintenance, growth, reproduction, wealth and disease of an organism. It includes food intake, absorption, assimilation, biosynthesis, catabolism and excrotion. A nutrient is a source of nourishment, a component of food.

There are various nutrients viz- carbohydrates, proteins, vitamins, fats and minerals. These are divided into two groups as –

(i) Macro nutrients

(ii) Micro nutrients.

There nutrients should be balanced for proper functioning of body. It should be remembered that not only a single nurtient can maintain optimal health and well being. So all the nutrients are necessary in different amount for a healthy body.

5.4.1 Discussion on Nutrients

Nutrients are broadly divided into two types–

(i) Macro nutrients : It includes protein, fats, and carbohydrates.

(ii) Micro Nutrients : It includes vitamins and minerals.

A brief description of those nutrients is given below –

(i) Protriens

Proteins are complex organic nitrogenous compounds. These are composed of carbon, hydrogen, oxygen, nitrogen and sulphur in varying amounts. Protien constitutes twenty percent. of the body weight in an adult.

Functions of protein–

(i) It helps in body building. These are important constituent of tissues and cells of the body.

(ii) It plays an important role in epairing and maintaining of body tissue.

(iii) It also supplies energy when the calorie intake is inadequate.

Source of Protein

Proteins are mainly found inmilk, meat, eggs, cheese, fish, pulses, cereals, beans, nuts, oil seed, cakes etc.

Requirement of protein :

(i) Adult man – 60 g / day

(ii) Adult woman – 50 g / day

(iii) Pregnant woman – 65 g / day

(iv) Children – 20 - 40 g / day.

Fat :

Fat is an important componant of diet and also concertrated source of energy. There are two kinds of fats viz– visible fots and invisible fats.

Viaible fats are those which can be separated from their natural source e.g. ghee from milk, cooking oil from oil bearing seeds.

Invisible fats are those which are not visible by our naked eyes. They are present in every article of food e.g. sereals, pulses, nuts etc.

Presence of diet is important for the absorption of fat soluble vitamins.

Sources of fats :

Fats are mainly present in ghee, butter, milk, eggs, meat, fish etc.

Requirement of fat :

Man – 20 gm/ day

Women – 20 gm / day

Pregnant women – 30 gm / day

Children – 20 - 25 gm / day.

Carbohydrate :

Carbohydrate is the main component of food and major source of energy.

Sources :

Carbohydrates are found in sugar cane, milk, sugar, grain,

food, roots, tubers and cereals etc.

Vitamins :

Vitamins are organic substances present in small amounts in food. These are required for carrying out many vital functions of the body.

Vitamins are divided into two groups–

(a) Fat souable vitamins

(b) Water soluble vitamins.

Fat soluble vitamins include vitamin A, O, E and K.

Water soluble vitamin includes vitamin of the B group and vitamin C.

A list of some vitamins, its sources and some discases which occur due to the vitamin deficiency is given below–

Name of Vitamin	Source	Disease
(i) Vitamin A	egg, cheese, milk, meat, fish.	Night blindness, conjuctival xerasis, Bitot's spot, corneal Xerosis, keratomalacia.
(ii) Vitamin D	egg. butter, cheese, fish, fish etc.	Rickets, osteomalacis
(iii) Vitamin E	egg yolk, cottonseed, sunflower seed, butten wheat germ oil	Reproductive failure.
(iv) Vitamin K	green leafy vegetables	When given to prognant women in a large amount can cause jaundice in the new born.
(v) Vitamin B_1	Cereals Milk etc	Beriberi
(vi) Vitamin B_2	Milk, egg	Cheilosis
(vii) Vitamin C	Guawa, orange, tomato, green leafy vegetables like cabbage, spinach, brinjal etc.	Scurvy

Minerals :

Minerals are some chemical elements which are required for growth, repair and regulation of vital body functions. This dictomy minerals can be divided into mainly two groups–

(i) Major Minerals

It includes calcium phosphorus, sodium, potassium and magnesium.

These minerals are required in large quantities.

(ii) Trace minerals

It includes iron, idodine, flurine, zine, copper, cobalt, chronaium manganese, selenium, silicon, tin and vanadium.

Our body, requires these in small quantities.

Minerals	Use	Source
(i) Calcium	(i) building bones (ii) Blood calf function (iii) Nerve and muscle function	Dairy produats, green leafy vegetables, neets etc.
(ii) Phosphorees	(i) building bones (ii) energy storage	Dairy products, fish, nuts.
(iii) Sodium	Nerve and muscle functions.	Milk, cheese, green olives
(iv) Potassium	Nerve and muscle functions	Dried fruits, citrees fruit, Banana, green leafy vegetables.
(v) Magnesium	Building bones, nerve and muscle functions.	Dairy products, green leaft vegetables, seafood, nuts.
(vi) Iodine	Thyroid gland function	Seafood, Iodized salt.
(vii) Iron	Muscle function	Beef, dried fruits, green leafy vegelables, eggs, potato baked with skin.
(viii) Zinc	Healthy skin, streng thening immunity system, wound healing	Red meat, legumes.

5.5 BIO CHEMISTRY

Bio-Chemistry is the branch of science dealing with the study of all the life processes such as control and coordination within a living organism. It basically studies the chemical and reactions and combinations which are involved in various processes like reproductions, hearedity, metabolism and growth. The important branches of biochemistry are– molecular biology, cell boilogy and genctice. Biochemistry has its own importance such as the chemical processes which transform diet or food items into compounds.

Along with these biochemistry is also essential to understand the following concepts which are as follows–

(i) To understand catalytic functions of engyms.

(ii) To understand how to utilize the potencial energy obtained from the oxidation of food stuff consumed for various energy requiring processes of the living cell.

(iii) To understand the properties and structure of substances that constitute the framework of tissues and cells.

(iv) To solve fundamental problems in medicine and biology.

(v) To understand the chemical processes which transform diet into compounds that are characteristics of the cells of a particular species.

Hence, biochemistry mainly deals with the study of the structure and funations of the biomolecule such as the carbohydrates, protiens, acids, lipids etc, which provide the structure of cells and perform many of the functions associated with life.



CHECK YOUR PROGRESS

Q 1: What is food?

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Q 2: Who is the author of Caraka Samhita?

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Q 3: How many groups of food stuff are mentioned in Caraka Samhita?

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Q 4: How many types of food are mentioned in Simadbhagavadgita.

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Q 5: What is Balanced diet?

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Q 6: What is the best food for an infant?

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Q 7: Write the names of any two macro nutrients.

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Q 8: Write down any two names of food which contains protien.

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Q 9: Mention any one disease which accurs due to the dificiency of vitamin B_1.

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Q 10: What are the important branches of Biochemistry?

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5.6 LET US SUM UP

- We have known about food and its classification
- We have got knowledge on nutrition and various nutrients.
- We have got an idea about boichemistry.



5.7 FURTHER READINGS

1) Ranade, Subhash, Deshpande, Rajendra and Bobade, Rajkuma B. A textbook of Swasthavritta. Delhi : Chaukhambha Sanskrit Protisthan.

2) Sohi, Darshan. A Comprehensive textbook of nutrition and theropeutic Diets.



5.8 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1: Food is a fundamental right of any living being. It gives energy to body to perform work properly.

Ans to Q No 2: Acarya Caraka.

Ans to Q No 3: Twelve types.

Ans to Q No 4: Three kinds of Aharal (food).

Ans to Q No 5: Where all the essential nutricuts are included.

Ans to Q No 6: Mother's milk.

Ans to Q No 7: Protein and fat.

Ans to Q No 8: Milk, egg.

Ans to Q No 9: Beriberi.

Ans to Q No 10: Molecular biology, cell biology and genelics.



5.9 MODEL QUESTIONS

Q 1: What is diet ?

Q 2: Write the charocteristics of vegetarian food.

Q 3: What are the main clements which are taken by the body from food?

Q 4: Write about two sources of carbohydrate.

Short question

Q 1: Write about the functions of food in body.

Q 2: Explain the classifications of food.

Essay type questions

Q 1: Write about the importance of food.

Q 2: Describe about the importance of nutrition.

Q 3: What is balanced diet? Write about balanced diet of different people of different ages.

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