Nutrition and Health

INTRODUCTION

- Nutrition may be defined as the science of food and its relationship to health. It is concerned primarily with the part played by nutrients in body growth, development and maintenance.
- The word nutrient or "food factor" is used for specific dietary constituents such as proteins, vitamins and minerals.
- Good nutrition means "maintaining a nutritional status that enables us to grow well and enjoy good health."

Malnutrition

• The deficiency of any essential constituent of food like Protein, Fat, vitamins, minerals leads to malnutrition and this in turn leads to specific disease.

Functions of Food

- 1.It provides energy for mechanical work.
- 2. It maintains growth, repair and reproduction.
- 3.It maintains the functions of body tissues and also body temperature.
- 4.It builds resistance against infections and diseases.
- 5. It satisfies appetite.

Classification of Food

- Classification by origin:
 - Foods of animal origin
 - Foods of vegetable origin
- Classification by chemical composition:
 - Proteins
 - Fats
 - Carbohydrates
 - Vitamins
 - Minerals

- CLASSIFICATION BY PREDOMINANT FUNCTION
- Body building foods:
- -meat, milk, poultry, fish, eggs, pulses etc
- Energy giving foods:
- -cereals, sugars, fats, oils etc.
- Protective foods:
- -vegetables, fruits, milk, etc

Proteins

- Functions of Proteins-
- Body building, repair and maintenance of tissue.
- Synthesis of antibodies, plasma proteins, hemoglobin, enzymes and hormones.
- Maintenance of osmotic pressure.
- For the production of heat and energy like carbohydrates.
- Responsible for cell mediated immune response.

Sources of Protein

• Animal Source:

Milk, Meat, Fish etc. They contain all essential amino acid.

• Vegetable Source: Pulses, Cereals, Nuts, Beans, Oils etc.

Protein Requirement

It is expressed in terms of body weight.

Group	Age	Protein (g/KG/Day)
Man	Adult	1
Woman	Adult	1
Infants	o-3 Months	2.3
	3-9 months	1.8
	9-12 months	1.5
Children	1-3 years	1.83
	4-6 years	1.56
	7-9 years	1.35
Adolescent	13-15 years	1.10/0.95
Male/Female	16-18 Years	0.94/0.88

Deficiency of Proteins

- Protein calories malnutrition(PCM) is the most prominent form of protein deficiency state.
- It occurs frequently among infants and young children between 1-3 years of age.
- The two clinical forms of PCM are-
- 1.Kwashiorkar(Moon like face)
- 2. Marasmus (old person like face)



Kwashiorkar

- It is a protein deficiency disease appears most commonly in children between the age 1-4 years.
- Symptoms-
- Edema commonly on legs but some time on face.
- Mental Changes.
- Poor appetite and diarrhoea.
- Diffuse depigmentation of skin and hair.
- Enlargement of liver.

Marasmus

- It is protein deficiency disease specially infants below 1 year.
- Symptoms-
- Severe muscle wasting
- Severe growth retardation.
- Marked wasting of skin and bone.
- Diarrhoea and modified hair texture

Treatment

- Adequate diet, treatment of infection and measures to prevent relapse.
- 3-5 gm of good quality protein per Kg of body weight per day
- Health education of parents and taking adequate care of child's nutritional requirement will prevent relapse.

Vitamins

• Vitamins are the complex organic compound which are essential for the normal metabolic function in the body, since the body cannot synthesis vitamins, they must be supplied through the diet.

	VitaminA	Vitamin D	Vitamin E	Vitamin K
Chemical Name	Retinol	Calciferol D2 - Erocalciferol D3- cholecalciferol	Tocopherol	Napthoquinone K1- Phylloquinone K2- Menoquinone
Sources	Carrot, Milk, Butter, Cheese, Papay a, Mango, Tomatoes	Fish,liver,oils, milk,egg yolk	Egg yolk,Milk, Butter,Green Vegetable,Nuts	Cabbage, Cauliflower,Fish liver,Fruits,leafy vegetables
Functions	 •Maintenance of healthy epithelial tissues •Proper functioning of Retina and Vision •Supports growth specially Skeletal growth 	 Promotes absorption andutilization of Ca and P Bone andteeth formation Increases the reabsorption of phosphate in kidney	•For reproduction and deficiency leads to sterility •Muscle metabolism •Antioxidant effect	For the synthesis of clotting factor prothrombin, Factor VII, IX and X

	VitaminA	Vitamin D	Vitamin E	Vitamin K
Deficiency Diseases	Night BlindnessXeropthalmiaBitot's SpotStunted growth	Rickets in ChildrenOsteomalacia in adults.	 Abortion and sterility in animals Anemia of new born Muscle weakness 	Slow blood clotting and hemorrhages in new born
Daily Requireme nt	750 microgram	2.5 microgram	8-10 mg	70-140 gm

	VitaminB1	Vitamin B2	Vitamin B3	Vitamin B6
Chemical Name	Thiamine	Riboflavin	Niacin, Nicotinic acid, Nicotinamide	Pyridoxine
Sources	Yeast, Liver, Peas, Pulses, Rice, Egg, Frui ts	Milk,Egg, Liver, Kidney, Fish Green leafy vegetables,Meat	Yeast,Fish,Pul ses,Liver,Kidn ey,Groundnut	Milk,Liver,Meat, Egg yolk,Fish,Green vegetables
Functions	 •Utilization of carbohydrates •Nutrition of nerve cells 	Necessary for tissue oxidation and growth	 Metabolism of carbohydrates ,fats and proteins Normal functioning of the skin.intestinal tract and nervous 	 Protein and fat metabolism Formation of polyunsaturated fatty acid Formation of WBC and RBC

	VitaminB1	Vitamin B2	Vitamin B ₃	Vitamin B6
Deficiency Diseases	Beri-beri	 •Angular stomatitis •Delayed wound healing •Increased susceptability to cataract 	Pellegra Tongue inflammation	Retarded growth Loss of body weight Anemia Skin lesions
Daily Requireme nt	1-1.5 mg	1.5-2 mg	10-20 mg	2-3 mg

	VitaminB12	VitaminB9	VitaminB 5	Vitamin B ₇	Vitamin C
Chemica l Name	Cyanocobalami ne	Folic Acid	Pantotheni c Acid	Biotin	Ascorbic Acid
Sources	Meat,Liver,Kidn ey,Egg,Milk,che ese	Green leafy vegetables,li ver,kidney,e gg	Liver,egg yolk,fresh vegetables	Liver,kidney,p ulses,nuts	Citrus Fruits,Tomat oes,Guava,Go oseberry
Functio ns	Maturation of RBC	Formation of RBC	Synthesis of corticoster oidsCompone nt of Acetyl Co A	•Growth of Bacteria •Carbohydrat e and fat metabolism	 Formation of intracellular cementing substance and collagen Facilitates iron absorption

	VitaminB12	VitaminB9	VitaminB5	Vitamin B ₇	Vitamin C
Deficien cy Diseases	Megaloblastic Anaemia Pernicious Anaemia	Megaloblastic Anaemia Glossitis Cheilosis GI Disturbances Infertility(Sever e)	Burning Foot Syndrome Adrenal insufficienc y	Dermatitis Muscular Pain Lethargy	Scurvey Bleeding of gums and loosening of teeth
Daily Require ment	2-3 gm	500 ug			60 mg

FATS

- These are compounds of glycerol with Fatty acid
- Fats are solid upto 20°c and if they are liquid at that temperature they are called as oils.

Classification

- Simple Lipids-e.g Triglycerides
- Compound Lipids- Phospholipids
- Derived Lipids Cholesterol

FATTY ACIDS

- On Hydrolysis fats yields fatty acids and glycerol
- Classification-
- Saturated fatty acids-Stearic acid, Palmitic acid
- Unsaturated fatty acids-
- Monounsaturated-Oleic acid
- Polyunsaturated-linoleic acid

Essential Fatty acids

- Some of the fatty acids that cannot be synthesized by the body are called as EFAs.
- They only obtained from food.
- The most important EFA is linoleic acidwhich serves as basis for the synthesis of other EFAs.ex- Linolenic acid, Arachidonic acid.

Sources of Fats

- Animal Fats- Ghee, butter, Milk, eggs
- Vegetable Fats- They are obtained from the seeds- eg. Groundnut, Sunflower etc.

Functions

- They provide energy and heat
- Fat beneath the skin protects against cold
- Fats serves as a vehicle for fat soluble vitamins
- Fats in the body supports the heart, Kidney etc
- Vegetable oils act as a good source of vitamin E
- They improve palatability of food
- Cholesterol is used in the synthesis of steroid hormone.

Fats and Diseases

- Obesity
- Coronary heart diseases
- Cancer
- Phrenoderma-Deficiency of EFA

Requirements

• Indian Council of Medical Research has recommended daily intake not more than 20% of total energy intake.

Minerals

- In human body there are at least 50 different mineral elements.
- These are obtained from food

Classification

- Major minerals-Calcium, Phosphorous, Sodium, Potassium, Magnesium
- Trace elements with known function-Iron, Iodine, F, Zn, Copper
- Trace elements with no known functions-Lead, Mercury, Barium, Aluminium

Functions

- They are constituents of bone, teeth and required for their growth.eg.Ca,P
- They are constituents of various body tissues eg- Iron
- They maintain electrolyte balance eg-Sodium, Potassium
- They maintain tone and function of muscle.eg-Calcium, sodium
- They stimulate digestive secretions
- They are necessary for growth.

	Calcium	Iron	Iodine	Fluorine	Zinc
Sources	 •Milk and milk products •Some fruits like Sitaphal •Dark green vegetables •Fish 	Meat, liver, eggs, f ish, cereals, gree n leafy vegetables, nuts, oil seeds	Sea foods like sea fish,sea salt Cod liver oil	Drinking water Sea fish cheese tea	Animal food and sea food milk
Functions	 Essential and major constituent of bones and teeth Participates in clotting of blood. Controls contraction of muscles Maintains rhythmic action of heart Involved in transmission of nerve impulses 	 To form hemoglobin Essential for formation and maturation of RBC Necessary for cell respiration and for transport of oxygen For brain development and function 	•Essential constituent of thyroid hormones	•Essential for normal mineraliz ation of bones •For formation of dental enamel	 Necessary for the action of enzymes Required for synthesis of insulin by pancreas. Necessary for formation of sperms

	Calcium	Iron	Iodine	Fluorine	Zinc
Deficie ncy Disease s	•Rickets in children •Osteomalacia in adults	 •Anaemia •Decreased resistance to infection •Diminished work performance 	•Goiter •Retarded physical growth and mental developme nt •Spontane ous abortion	•Excess of fluorine causes fluorosis •Deficienc y causes dental caries	 Retarded growth Sexual dysfunction Multiple infection Skin disorders Alopecia
Daily Require ment	400-500mg	15-30 mg	15oug	o.5-o.8 mg/lit	5-10 mg

	Copper	Phosphoro us	Sodium	Potassium
Sources	Sea water,vegetables,Milk ,Brain and Liver	Cheese, Meat ,Liver, Cereal s, pulses, Nuts and oil seeds	Fish,Meat,Eg g,Milk,Cooki ng salt	Almonds, Apple, Banana, Cabbage ,potato
Functions	For the synthesis of Hb	 •P is associated with ca and vit.D in the hardening of bones and teeth. •Maintain constant composition of body fluids 	•Cation of extracellular fluid •For electrolyte balance •Acid-base equilibrium •Transmissio n of nerve impulses	 Cation of intrcellular fluid Acid base equilibrium Transmission of nerve impulses

	Copper	Phosphorous	Sodium	Potassium
Deficienc y Diseases		Softning of bones Dental caries	Hyponatremi a Retaded growth Muscular cramps Dehydration Acidosis	Hypokalemia Retarded growth
Daily Requirem ent	2 mg	ı gm	2-5 gm	5-7 gm

BALANCED DIET

 A balanced diet may be defined as diet which fulfils the need for energy and provides adequate amount of proteins, amino acids, vitamins, fats, carbohydrates and other nutrients needed to maintain health, vitality and general well being.

Composition of Balanced Diet

- Principles-
- Daily requirement of protein-15-20% of the daily energy intake.
- Fats should be limited to 20-30% of daily energy intake.
- Carbohydrates rich in natural fibre should constitute the remaining food energy.
- The requirements of micro nutrients should be met.

- A Typical balanced diet for an adult as given below:
- Cereals- 400 gm
- Leafy vegetables- 114 g
- Other vegetables- 85 g
- Pulses and nuts- 85 g
- Roots and tubers- 85 g
- Fruits- 85 g
- Milk & Milk products- 264 gm
- Flesh Food- 125 gm
- Sugar & Jaggery- 57 g
- Oils and Fats- 57 gm
- The nutritive value of this diet is approximately 3000 calories and it contains 90 g proteins,90 g fats,450 g carbohydrates and adequate quantities of vitamins and minerals.