

NUTRITIONAL PROBLEMS IN INDIA

28.1 INTRODUCTION

You have already learnt that you require different nutrients to carry out the vital functions of your body. The adequate intake of these nutrients is necessary for optimum health. Since different nutrients perform specific functions, their deficiencies or excesses lead to impairment of body functions. You have also read that changes in appearance or functions of the body are referred to as *clinical features*. These can be easily detected and adopted for identification of nutritional problems in the community.

In this lesson, you shall read about the deficiencies and excesses among people of different nutrients. Clinical features, prevention and treatment of the deficiency disease will also be studied.

28.2 OBJECTIVES

After reading this lesson, you shall be able to :

- enlist common nutritional problems deficiencies and excesses in our country;
- state the causes of each nutritional problem/disease;
- enumerate the clinical features of each of these deficiency diseases;
- discuss measures of prevention and treatment for these nutritional deficiency diseases;

28.3 NUTRITIONAL PROBLEMS

You have learnt that when there is an imbalance in the intakes of various nutrients, it leads to malnutrition. Deficient intake of nutrients causes undernutrition and excess intake results in overnutrition.

In India, since a large number of people in India are poor, illiterate and ignorant of the importance of hygiene and sanitation. They also consume inadequate amount of nutrients. They also suffer from infections that result in poor utilization of nutrients and therefore resultant undernutrition. This form of malnutrition is most common in our country. You know that the nutrient requirements are more among growing children, pregnant women and lactating mothers. Inadequate consumption of nutrients along with/without infections during these periods leads to malnutrition.

Excessive intake of nutrients results in undesirable accumulation of nutrients in the body. Excess intake of energy leads to overweight/obesity. Similarly, excess intake of fluoride is observed as fluorosis.

Most common nutritional problems around you could be the following:

NUTRITIONAL DEFICIENCIES	NUTRITION EXCESSES
Protein energy malnutrition	Fluorosis
Vitamin A deficiency	Obesity
Anaemia or iron deficiency	
Iodine deficiency	

You will now read about each of these nutritional problems in detail.

28.4 PROTEIN ENERGY MALNUTRITION (PEM)

As the name indicates, deficiencies of energy and protein in the body leads to protein energy malnutrition.

Do you know that every third child below the age of 5 years in our country is suffering from some degree of PEM? How can you recognise it? Any form of PEM is characterised by low body weight, indicating growth failure. In children, PEM is characterised chiefly by two forms:

- (a) Marasmus
- (b) Kwashiorkor

Marasmus

Marasmus is the most common form of PEM you will observe among children below 1 year of age.

Marasmus is caused when the mother suddenly stops breast feeding the child and instead feeds him on starchy foods like sago, potato, etc. This results in providing insufficient energy and protein to the child leading to marasmus. Lack of these important nutrients, results in marasmus.

A marasmic child can be recognised by following clinical features:

- Muscle wasting- Due to the inadequacy of energy and protein in the diet, the muscles get loose and skin becomes wrinkled. The child looks very thin and weak.

- **Irritability:** The child becomes extremely weak and becomes irritable. The child cries continuously. His cries can be barely heard due to extreme weakness.
- **Growth failure-** Deficiency of energy and protein cannot meet the increased requirements of the growing body the child. Hence the child fails to grow and thus is smaller than the healthy children of his age.
- **Diarrhoea :** A marasmic child has frequent watery stools (diarrhoea). Consequently, the child gets dehydrated.

Kwashiorkor :

Causes for kwashiorkor are similar to marasmus. It occurs when the amount as well as quality of protein is inadequate in the diet. Kwashiorkor occurs in children between 2-3 years of age. Mother usually continue to breast feed her child till 2 years or till the next child is born. The breast milk is suddenly withdrawn and the child is given roti/ rice to eat. This results in the child getting some energy from starchy foods but the protein intake is extremely poor.

You can identify a child with kwashiorkor exhibiting following clinical features:

- **There is oedema -** This means swelling in any part of the body due to excessive accumulation of fluid. You can easily detect it by pressing the skin with your fingers. Because of fluid accumulation under the skin, a depression can be seen at the place where you apply the pressure.
- **Growth failure-** A child loses weight and fails to grow at the normal pace. However, the loss in weight is less severe than seen in marasmus.
- **Skin changes-** If and these are characteristic features of kwashiorkor. The skin becomes thick, and appears stony and varnished. It gets peeled off leaving behind cracks.
- **Hair changes-** Hair become thin, sparse, easily pluckable, lose their natural shine and black colour. The hair change to reddish colour.
- **Mental changes -**The child is usually irritable and has no interest in the surroundings.
- **Moon face-** The face of the child becomes puffy with oedema and appears round like moon.
- **Change in liver size.** The liver becomes enlarged in a child suffering from kwashiorkor.
- **There are symptoms of vitamin and mineral deficiencies in addition to the extreme conditions of marasmus and kwashiorkor.** The child may exhibit clinical features of deficiencies caused by vitamin A, B complex, and the mineral-iron.

Prevention of PEM

In order to prevent PEM in young children, it is important to improve the nutritional status of mothers. The nutritional status of the young child is dependent on the breast milk he receives from the mother.

PREVENTIVE MEASURES FOR PEM

You can follow some of the measures enlisted in the direction to prevent PEM:

- (i) Ensure that adequate nutrition is provided to the pregnant woman so that she delivers a normal and healthy child. In poor families, it is difficult to provide for the increased nutrient needs of the pregnant woman. The government supplies the additional (supplementary) food under different feeding programmes for the pregnant and lactating women.
- (ii) Adequate nutrition is provided to the lactating mother so that she can provide sufficient quantity of high quality milk to breast feed her child.
- (iii) The child should be exclusively breast fed for 4-6 months and then gradually weaning food like fruit to juices, dals, rice water cereal gruels can be supplemented with the breast feeding. Gradually the child can be given normal home diet.
- (iv) Nutrition education should be imparted to all women between 15-45 years of age. They should be educated to look after their families and themselves. They should be acquainted with the :-
 - importance of balanced diet throughout the different stages of life.
 - need to avail the government services under nutritional/health programmes in order to prevent PEM.
 - need to maintain hygienic and sanitary conditions in and around the house.
- (v) The child should be protected against the communicable diseases through timely immunisation.

Treatment of PEM :

You have learnt that PEM is caused due to lack of energy and protein in the diet. This leads to loss of body weight. Therefore, its treatment lies in providing the malnourished children with energy and protein rich foods so that there is adequate weight gain. These foods can be prepared from the usual home diets. However, in children belonging to poor families and in children with severe PEM, such foods can be provided through the various supplementary feeding programmes implemented by the government.

You also know that PEM is associated with infections and diseases e.g., diarrhoea, respiratory infections etc. These should be immediately treated. Remember that you should not restrict food intake during infections. In fact, the child should be fed as usual.

ACTIVITY : Check your knowledge after reading the text :

1. Malnutrition means :
 - (a) Under nutrition
 - (b) Over nutrition
 - (c) Under & over nutrition
 - (d) Under or overnutrition
2. Marasmus can be observed in children below :
 - (a) six months
 - (b) 1 years
 - (c) 2 years
 - (d) 5 years
3. A marasmic child is irritable because he is :
 - (a) weak
 - (b) crying
 - (c) angry
 - (d) hungry
4. A common symption between Marasmus and kwashiorkor is :
 - (a) Oedema
 - (b) Hair change
 - (c) Growth faliure
 - (d) Moon face
5. List four typical symptoms of :
 - (i) Marasums
 - (ii) Kwashiorkor
 - (iii) Obesity
 - (iv) Overnutrition.
6. List two causes each of malnutrition
 - undernutrition
 - overnutrition
7. Suggest 4 sure ways of preventing malnutrition.
8. Expand PEM to full form.

INTEXT QUESTIONS 28.1

Tick (✓) mark the appropriate answers :

1. A nutritional problem is a disease occurring due to
 - (a) over eating a nutrient
-

- (b) under eating a nutrient
 - (c) both over and under eating a nutrient
 - (d) neither over nor under eating a nutrient
2. Some other reasons for malnutrition besides poor consumption of food for are :
- (a) lack of hygiene and frequent infections
 - (b) frequent infections and poor utilisation
 - (c) poor utilisation of nutrient and lack of hygiene
 - (d) all the above
3. Children need special attention regarding nutrition during
- (a) first one year
 - (b) periods of fast growth
 - (c) school going years
 - (d) preschool years
4. Name two states of malnutrition.
5. Write full form of PEM.
6. Name two problems occurring due to PEM.
7. State important symptoms of Marasmus and Kwashiorkor
8. Suggest some preventive control measures for PEM.
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28.5 VITAMIN A DEFICIENCY (VAD)

You have already read about the importance of vitamin A in the diet. You will recall that the intake of vitamin A for vision during dim light is of particular importance. VAD can occur at any age. However, young children, pregnant and lactating women are most commonly affected by various stages of VAD. Do you know that deficiency of vitamin A is widely prevalent in our country. At least 30,000 to 40,000 children are at risk of becoming blind each year due to vitamin A deficiency (VAD).

When vitamin A deficiency occurs, the individual has problem in seeing in the dark. If this deficiency is not treated, the individual becomes completely blind. *Xerophthalmia* refers to the complete range of eye disorders associated with vitamin A deficiency.

Do you remember some of the clinical features of vitamin deficiency? These are as follows :

- (i) Night blindness- Have you seen a child groping in the dark around dusk? This is known as night blindness. The individual experiences difficulty in seeing during dim light. It is one of the first symptoms of VAD.
-

- (ii) **Conjunctival xerosis**- The white portion of the eye is called conjunctiva. When there is dryness (xerosis) in the conjunctiva the condition is known as conjunctival xerosis. How can you detect this dryness? It is quite simple. You stand on one side of the individual and ask him to move the eyeballs side ways. In doing so, you may observe wrinkles and dryness on the conjunctiva. Conjunctiva may also become dull and lose its brightness. Sometimes it becomes so dry that even the tears disappear.
- (iii) **Bitots spots**- (These spots have been named after the scientist who discovered them) this is also due to deficiency of vitamin A. Bitot spots can be seen as dry, foamy, opaque, triangular spots on the conjunctiva.
- (iv) **Corneal xerosis**- Cornea is the black portion of the eye. VAD affects the cornea. It becomes dull and dry. The dryness of cornea is referred to as corneal xerosis. If the condition is not treated immediately, the cornea will get damaged.
- (v) **Keratomalacia**- This is the most dangerous sign of vitamin A deficiency. If an individual reaches this stage, it results in complete blindness. This impairment can be seen among children between 1-5 of age. The cornea becomes very soft and gets easily infected. The cornea gets totally damaged and child becomes blind.

PREVENTION OF VITAMIN A DEFICIENCY

You have now learnt that vitamin A deficiency is a serious public health problem in our country. It leads to complete blindness particularly among children. The government of India has launched a "National prophylactic programme" to prevent blindness due to vitamin A deficiency. This programme has the following measures through which VAD can be prevented:

- Short term measures
- Long term measures

Under the *short term measures*, large doses of vitamin A solution are given periodically to children aged between 6 months to 5 years. You must ensure that by the age of 5 years the child should have received at least 9 doses of vitamin A. The doses are as follows :

6 months-12months	:	1,00,000 I.U.
+1 year to 5years	:	2,00,000 I.U

Remember, the dose is to be given once in 6 months.

Long term measures include educating the community regarding increased consumption of vitamin A rich foods. This is the most feasible, economical and sustainable measure to prevent VAD in our country. You can obtain vitamin A from animal as well as plant sources. Can you recall the rich sources of vitamin A? Yes, following foods are rich sources.

Animal foods - milk and its products, meat and its products

Plant foods - yellow or orange vegetables and fruits dark green leafy vegetables.

You know that vitamin A is a fat soluble vitamin. You must educate the community to ensure adequate fat intake for better absorption of vitamin A in the body. You must particularly educate the lactating mothers to breast feed their children as long as possible. They should also be educated to initiate breast feeding soon after the child birth since colostrum is an excellent source of vitamin A.

An important way to increase consumption is to increase the availability of vitamin A rich foods. You should educate the community to establish home gardens and grow some vitamin A rich vegetables and fruits at homes. Home produce is not only cheaper and fresh, but is more nutritious as well.

TREATMENT OF VITAMIN A DEFICIENCY

You have already read about the measures to be taken to prevent vitamin A deficiency. The individuals suffer from this deficiency when proper measures are not taken to prevent VAD.

In such cases, VAD should be treated by giving the large doses of vitamin A. For a milder forms of VAD like night blindness, bitots spots and conjunctival xerosis an oral dose of 2,00,000 I.U. of vitamin A should be given. However when cornea is involved, an intramuscular dose of 1,00,000 I.U. should be given immediately.

INTEXT QUESTION 28.2

Tick (✓) mark the correct answer

1. Xerophthalmia refers to complete range of eye disorders associated with deficiency of
 - (a) vitamin A
 - (b) iron
 - (c) vitamin B
 - (d) protein
 2. Night blindness refers to inability to see
 - (a) in dark
 - (b) at night
 - (c) at dusk
 - (d) in dim light
-

3. The part of eye that gets affected in conjunctival xerosis is :
 - (a) pupil
 - (b) conjunctiva
 - (c) both pupils and cornea
 - (d) cornea
 4. Bitot spots are found on :
 - (a) conjunctiva
 - (b) cornea
 - (c) teeth
 - (d) gums
 5. The most dangerous stage of vitamin A deficiency is called :
 - (a) Bitot's spots
 - (b) Keratomalacia
 - (c) Corneal xerosis
 - (d) Xerophthalmia
 6. The large dose of vitamin A for children between 6-12 months is :
 - (a) 50,000 I.U
 - (b) 1,00,000 I.U
 - (c) 1,50,000 I.U
 - (d) 2,00,000 I.U
 7. Large dose of vitamin A for children between 1—5 years is :
 - (a) 1,00,000 I.U
 - (b) 2,00,000 I.U
 - (c) 1,50,000 I.U
 - (d) 2,50,000 I.U
 8. Number of doses of vitamin A received by a 5 years old child should be :
 - (a) 5 doses
 - (b) 7 doses
 - (c) 9 doses
 - (d) 11 doses
 9. Name 3 animal and 3 vegetable sources of Vitamin A.
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10. State long and short term measures for treating Vitamin A deficiency.
11. Name the most vulnerable group of population who has Vitamin A deficiency.

28.6 IRON DEFICIENCY

You have already learnt that iron is an important mineral needed for the formation of haemoglobin. The red colour of the blood is imparted by haemoglobin. It helps in carrying oxygen to tissues in the body. Thus, if iron is inadequate in the diet, less amount of haemoglobin will be formed. This will decrease the oxygen carrying capacity of the blood. When iron deficiency gets prolonged, it leads to *iron deficiency anaemia*.

Anaemia is a condition where haemoglobin level in the blood falls below the normal level. There are normal levels set for different age groups. For example, if you are a 12 year old girl, your normal haemoglobin should be above 12 g per 100 ml of blood. You can refer to table 1 for normal haemoglobin levels in various age groups.

Table 28.1

Normal levels of haemoglobin in different age groups

Age	Haemoglobin g/ 100 ml
6 months to 6 years	(more than) > 11
6 years to 14 years	> 12
Adult males	> 13
Adult females (non pregnant)	> 12
Pregnant women	> 11

Do you know that iron deficiency anaemia is widely prevalent in our country? It is one of the most common nutritional deficiency seen in India. Anaemia can occur at any age and in both sexes. However, like other nutritional deficiencies it is most common among children, pregnant women and lactating mothers. Above 50 percent of pregnant women suffer from anaemia. You shall be surprised that 20 per cent of total maternal deaths are caused due to anaemia.

How is anaemia caused ?

It is caused by the following list :

- Inadequate intake of iron in the diet.
- Decreased availability and absorption of iron in the body.
- Increased loss of blood e.g.. Menstruation in women and haemorrhages in men.
- Increased worm infestations in intestines.

Anaemia is caused not only due to the deficiency of iron but is also associated with deficiencies of protein, folic acid, vitamin B 12, vitamin B 6 and copper to some extent. 85% of the anaemias are caused due to the deficiency of iron. You will read more about iron deficiency anaemia.

CLINICAL FEATURES OF IRON DEFICIENCY ANAEMIA

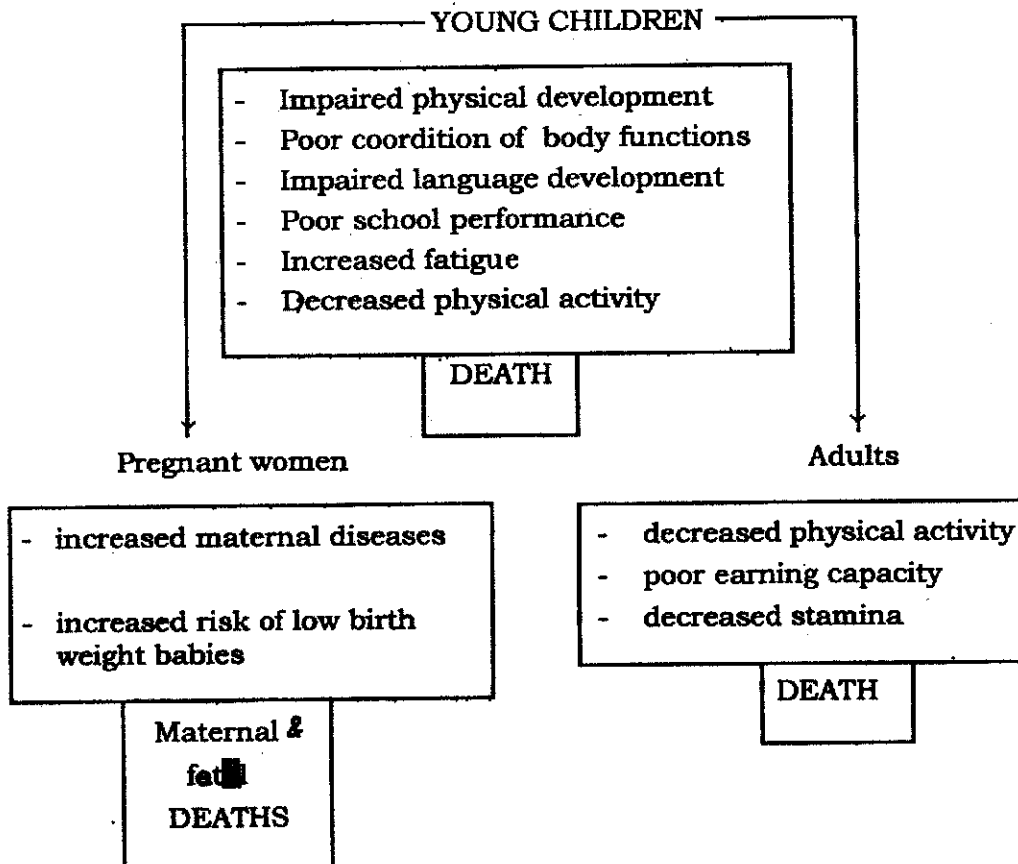
You must have seen individuals suffering from anaemia. What did you observe ?

Generally, an individual with anaemia exhibits following signs and symptoms :

- tiredness
- breathlessness on exertion
- headache
- giddiness
- sleeplessness
- loss of appetite
- increased palpitation
- paleness of tongue, face, conjunctiva and nails
- feeling of pins and needles on fingers and toes
- brittle nails, nails becoming concave-looking like a spoon. This condition is called *koilonychea*.

Do you know that iron deficiency anaemia has serious consequences on the health of people. Figure below shows the affect of anaemia at different ages.

CONSEQUENCES OF IRON DEFICIENCY ANAEMIA



PREVENTION OF IRON DEFICIENCY ANAEMIA

Knowing the widespread prevalence and serious effects of iron deficiency anaemia, you would agree that it is important to prevent this serious nutritional problem. At the national level, the Government of India has launched a "National Nutritional Anaemia control programme". According to this programme, two important preventive measures are :

- A Providing iron and folic acid tablets called **folifer tablets** to the groups with higher risk.
- B Promoting regular consumption of foods rich in iron.

(A) Providing iron and folic acid tablets:

You know that young children, pregnant women, lactating mothers and women using family planning methods (like copper T) etc. are at higher risk of anaemia. Therefore, folifer tablets are provided to them. The size and dose of children vary from that of adults. Children are given small tablets and adults are given big tablets.

Age	Dose
• children below 5 year	1 tablet containing 20 µg elemental iron and 100 µg folic acid
• Pregnant women (2nd and 3rd trimesters)	1 tablet containing
• Lactating mothers	60 µg elemental iron
• Women using family planning methods	and 500 µg folic acid

note : 'µg' is for microgram which is 1/1,000 of a milligram.

The dose is for a period of 100 days; you have to give one tablet each day for 100 days in a year.

(B) Promoting consumption of iron rich foods:

You can ensure adequate consumption of iron rich foods among people around you through following ways:

- Make people aware of the serious consequences of anaemia and the need to prevent it.
- Educate people regarding the need for regular dietary intake of iron and folic acid rich foods, particularly among groups with higher risk of anaemia. Can you recall some iron rich food? Identify such locally available foods around you.
- Ensure that the weaning foods of infants who are 4 months and above must incorporate iron rich foods like green leafy vegetables.

- Promote the adequate intake of vitamin C rich foods such as amla, lemon, orange, mango etc. along with iron rich foods. You shall recall here that vitamin C helps in absorption of iron in the body. Advise people to reduce intake of tea and coffee, as they inhibit iron absorption.

TREATMENT OF IRON DEFICIENCY ANAEMIA

Severe cases of anaemia should be treated immediately. How will you identify an individual with severe anaemia? It is simple. It can be diagnosed by testing the haemoglobin level in the blood through laboratory examination. An individual with haemoglobin level less than 7g/100ml of blood is considered severely anaemic. In case you do not have easy accessibility to laboratory facilities, clinical signs can help you identify anaemia cases.

Optimum dose of iron is prescribed for one suffering from severe anaemia. For example, the recommended dose for a woman between 15-45 years of age is; one folifer tablet thrice a day for a minimum of 100 days in a year. You should also refer a severely anaemia case to the hospital.

INTEXT QUESTIONS 28.3

Tick (✓) mark the appropriate answer :

- (i) Function of iron is to :
- | | |
|----------------|---------------------------|
| (a) form blood | (b) carry oxygen |
| (c) carry food | (d) carry food and oxygen |
- (ii) Normal haemoglobin for a 12 year old girl is :
- | | |
|------------------|------------------|
| (a) 10 g/ 100 ml | (b) 11 g/ 100 ml |
| (c) 12 g/ 100 ml | (d) 13 g/ 100 ml |
- (iii) Normal haemoglobin for a 5 year old is :
- | | |
|------------------|------------------|
| (a) 10 g/ 100 ml | (b) 11 g/ 100 ml |
| (c) 12 g/ 100 ml | (d) 13 g/ 100 ml |
- (iv) Increased worm infestation can lead to :
- | | |
|-------------------|-------------------|
| (a) anaemia | (b) bitot spots |
| (c) keratomalacia | (d) xerophthalmia |
- (v) Folifer tablets are for :
- | | |
|-------------------------|----------------|
| (a) iron | (b) folic acid |
| (c) iron and folic acid | (d) vitamin A |
- (vi) Folifer tablet contains :
- | |
|--|
| (a) 20 µg of iron and 100 µg of folic acid |
| (b) 20 µg of iron and 150 µg of folic acid |

Certain vegetables like cabbage, cauliflower, turnip etc. have goitrogens in them. You must remember that these substances can be destroyed by cooking.

Can you identify an individual suffering from iodine deficiency disorders? (You have just read that IDD is a spectrum of disabling conditions. However, you will come across people suffering most from goitre and cretinism. You can refer to figure-for other implications of IDD.) You can now read about the clinical features of various forms of IDD.

Clinical features

In this lesson, you shall restrict to the clinical features of goitre and cretinism.

Goitre: You know that goitre is the enlargement of thyroid gland. This enlargement can vary in size depending upon the duration and severity of the goitre. In fact, you can grade goitre from grade 'O' (zero) where no enlargement is visible to grade 'IV' where enlargement of neck can be seen from a distance. Do you know that goitre is more common amongst girls than boys? The enlargement increases with age reaching a maximum at puberty. It is extremely important to prevent goitre because, once the neck enlargement occurs, it is almost impossible to revert it to the normal size.

Do you know that nearly 54 million people suffer from goitre? And you can avoid the occurrence of goitre simply by including fruits and vegetable grown on iodine rich soil in your daily meals or by using iodised salt in daily cooking.

Cretinism: It is one of the most severe forms of IDD. When it occurs during foetal stage, it interferes with the brain development causing brain damage and later death. If severe iodine deficiency continues after birth, it not only leads to growth failure, mental retardation, speech and hearing defects (deaf-mutism) and paralysis. Do you know nearly 2.2 million cretins are found in india alone.

PREVENTION AND CONTROL OF IDD

You know that prevention is better than cure. IDD has serious consequences on the health of the population. The Government of India has launched a "National Iodine Deficiency Disorders Control Programme" in order to prevent its people from this widespread problem. The main focus of the programme is to provide iodine in the diets of the people. There are various methods that have been adopted to ensure adequate iodine consumption. These are :

- (i) Use of iodised salt.
 - (ii) Use of potassium/sodium iodide tablets.
 - (iii) Use of iodized oil.
- (i) **Use of iodised salt:** You have seen TV and radio advertisements recommend the use of iodised salt in cooking? What is iodised salt? It

is salt which has Iodine added to it. People take salt every day hence, it is one of the sure way of consuming iodine. It is also one of the cheapest methods of making iodine available to everybody and thus ensuring adequate consumption.

- (ii) **Use of iodised tablets** : Iodide tablets have been administered to school children but this method is neither very practical, nor widely accepted.
- (iii) **Use of Iodized oil** : This method is principally used for those who are actually suffering from iodine deficiency disorder. It is also used as a preventive measure for the control of IDD in areas where it is severe. The advantage is that an injection of 1 ml dose of iodised oil provides protection to an individual for 3—5 years. Attempts are also being made to use iodised oil by mouth for controlling IDD. Injections are not only expensive but are not much acceptable to the community.

INTEXT QUESTION 28.4

Tick (✓) mark the correct answer :

- Iodine deficiency causes :
 - anaemia
 - Bitot's spot
 - goitre
 - xerophthalmia
- One of the common symptom of Iodine deficiency is enlargement of :
 - cornea
 - liver
 - neck
 - chin
- Goitrogens are substances which :
 - produce thyroxine
 - interfere with utilisation of iodine
 - facilitate utilisation of iodine
 - stop production of thyroxine
- Cretinism occurs during :
 - foetal stage
 - adulthood
 - childhood
 - adolescence
- An injection of 1ml of iodised oil provides protection for :
 - 1 year
 - 1-2 years
 - 3-5 years
 - life time

28.8 DISEASES OF NUTRITIONAL EXCESSES

There are certain health problems related to the excessive intakes of various nutrients. You will study about two such nutritional problems:

- (i) Fluorosis
- (ii) Obesity (overweight)

(1) FLUOROSIS

You already know that fluorine is needed for the normal growth and development of bones and teeth. If inadequate amounts of fluorine are consumed, it leads to cavities in the teeth called *dental caries*. On the other hand, if you consume excess of fluorine, it results in fluorosis. Thus, fluorine is to be consumed only in optimum amounts, neither less nor more.

You will observe fluorosis in people living in areas where fluoride content of drinking water is high. You will find fluorosis in Andhra Pradesh, Punjab, Karnataka, Rajasthan, Tamil Nadu and Uttar Pradesh.

CLINICAL FEATURES OF FLUOROSIS

There are two types of fluorosis:

- (i) Dental fluorosis
- (ii) Skeletal fluorosis

Dental fluorosis: When fluorosis is present in milder forms, teeth get involved. This condition is called *dental fluorosis* and usually, is seen in children above 5 years of age. The teeth lose their white colour and shine. They become chalky and pale white. Patches appear on them. Later these patches become yellowish. These changes are called 'mottling of teeth.' Carefully observe and see if you can recognise a cases of dental fluorosis in your area.

Skeletal fluorosis : It is usually seen in older adults. In severe form of fluorosis the entire skeletal system is involved. This condition is called *skeletal fluorosis*. The nerves are affected causing pain, numbness or tingling sensation in the extremities. There may be pain in the back.

Later, it leads to stiffness in neck and skeletal deformities. In severe cases, the individual is completely bed-ridden. Recently in Andhara Pradesh and Tamil Nadu, a form of skeletal deformity associated with fluorosis has been identified. Instead of older adults it is observed in young adults. In this case, the lower limbs are affected and they appear as 'knock kneed.' This condition is called **genu-valgum**.

Prevention of fluorosis:

You must remember that fluorosis can be prevented but not cured. You have already learnt that fluorosis is caused by the drinking water containing fluoride in amounts greater than 1mg/ litre. Thus, to prevent fluorosis the best measure is to drink water which contains safe levels of fluoride (below 1mg/litre) in it. In case you live in area endemic to fluorosis, the

easiest way is to reduce fluoride content in the drinking water at your own home. This method is known as **defluoridation of water** at household level produce of water defluoridation. You first add lime powder to the pot of drinking water. Then add alum to it. Stir it well for 10 minutes. Then decant off the water and store it in clear containers. Such water will be safe to drink and you shall be able to protect yourself from fluorosis.

(ii) OBESITY

How do you react when you see someone fat? Do you laugh or make fun of that person? Usually, people do it. But there is nothing funny about being fat. Infact, it is a serious health problem and has several implications.

In nutrition, fatness is referred to as 'obesity' and 'overweight'. Thus obesity is a problem of overnutrition resulting due to higher consumption of energy rich foods than actually required by the body. Additional, energy consumed, is not completely used by the body because of decreased physical activity. Thus, you can say that obesity is a product of **energy imbalance** where energy consumption is higher than the energy expenditure.

Energy intake = Energy output (Energy balance)

Energy intake > Energy output (Energy imbalance)

When energy intake exceeds energy output (physical activity), then the extra energy gets deposited in the body in the form of fat and leads to weight gain. The body weight increases above the desirable level for the person's age and height. **In case the body weight is 20 % more than the desirable weight the condition is called obesity.** If the weight is between 10%-20% above the desirable level, it is called overweight.

Let us understand with the help of an example. The desirable body weight for a woman with height 160 cm is 52.2kg. If her weight increases to 63.0kg or more, she is obese. In case, her weight gain is between 57.8kg and 63.0kg, then she is overweight.

Have you ever thought as to why a person becomes obese? These are various factors which contribute to obesity. They are as follows :

- (i) **Genetic factors** : You must have seen that certain families have a tendency to become obese. It is because the genes causing obesity are carried from one generation to the other. In fact, studies have shown that in families where one of the parents is obese, the chances of the child getting obesity are 40% and if both parents are obese, the possibility of their child becoming obese increases upto 10 percent. Thus, you can consider obesity to be hereditary problem to a certain extent.
- (ii) **Environmental factors** : Besides heredity, the environment plays an important role in determining the state of health. Food is one such factor. If a person generally overeats, the chances of becoming obese are high for him. It is not the amount of food alone but also the type of

food a person eats, which affects the body weight. Overeating coupled with frequently eating of energy rich foods like cake, pastries, jams, jellies, butter, cheese, pakoras, samosas and fried foods certainly increases the risk of obesity. You must have seen people overeating when they are very *excited or tense*. These psychological factors lead to excessive food intake beyond one's body needs. *Lack of physical activity* is one of the major risk factors of obesity. Those people who are usually involved in mental work, spend maximum time in sitting or doing very light physical jobs are more prone to obesity. Rich and affluent people are mostly involved in light physical work and expensive food items which are also energy rich, The lifestyle that such people follow is called sedentary life style. It is a contributory factor causing energy imbalance and obesity.

You must know that obesity has serious ill-effect on the health of a person. Excess body weight leads to undue load on the different organs like heart and kidneys. Overweight causes of their normal functioning. Hypertension (increased blood pressure), heart diseases and diabetes (increased blood sugar) are some of problems related to obesity.

You must be wondering; if obesity is such a serious health problem, can it be controlled? Yes, of course. The various ways by which you can control obesity are being discussed below.

CONTROL OF OBESITY

You know that heredity is one of the important contributory factors to obesity. You also know that you do not have any control on heredity factors. You can just advise a person with potential to become obese to eat in moderation and do regular physical exercise.

Environment factors leading to obesity are you must follow certain as follow :

- (i) Eat food according to your body requirements.
- (ii) Don't eat food very frequently. A well balanced diet is extremely important. At least 3-4 hour interval between meals is essential.
- (iii) Nibbling in between meals should be avoided.
- (iv) Select and eat foods that will not increase your body weight.
- (v) Eat more of green leafy vegetables and fruits as they have enough fibre in them. Fiber helps in adding bulk to the diet, thus giving a feeling to fullness to the stomach. Fibre is neither absorbed nor utilised by the body. It aids in maintenance of normal bowel movement.
- (vi) Avoid intake of fatty and fried foods like cakes, pastries, organ meats, fried snacks, nuts, oilseeds, butter, and cream etc. These foods are rich sources of energy and their intake leads to increased fat deposition in the body.


- (vii) Regular physical exercise should be emphasised. This will help in burning of the extra energy consumed. Exercise help in weight reduction and weight maintenance.

INTEXT QUESTIONS 28.5

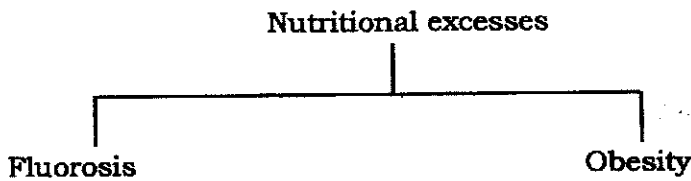
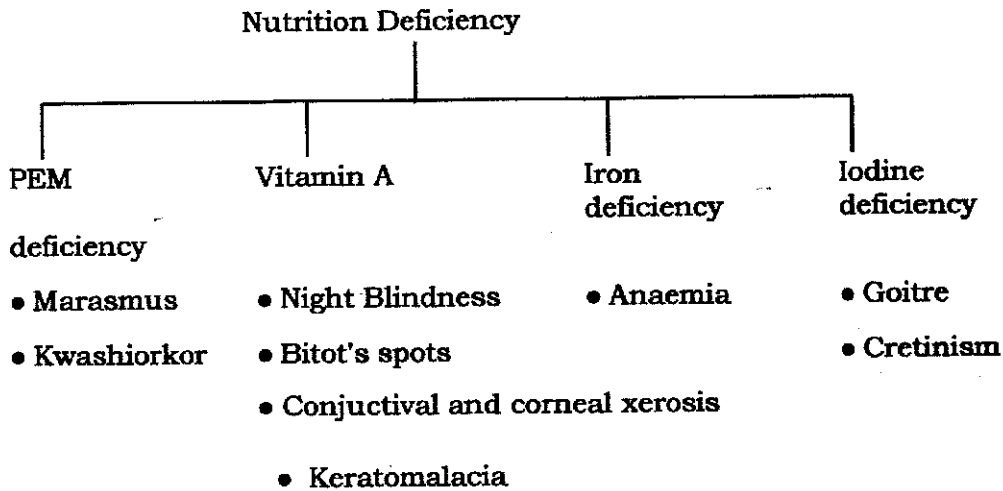
Tick (✓) mark the correct answer :

1. Two diseases of nutritional excesses are :
 - (a) Fluorosis and obesity
 - (b) Goitre and obesity
 - (c) Fluorosis and goitre
 - (d) Fluorosis and cretinism
2. Fluorosis is related to the growth and development of :
 - (a) eyes and teeth
 - (b) bones and teeth
 - (c) teeth and brain
 - (d) teeth and nerves
3. Skeletal fluorosis occurs among :
 - (a) adults
 - (b) adolescents
 - (c) children
 - (d) all
4. Besides genetic reasons the obesity also occurs due to :
 - (a) over eating
 - (b) under eating
 - (c) over and under eating
 - (d) not eating at all

28.9 WHAT HAVE YOU LEARNT

- Concept of malnutrition
 - Its causes— • overnutrition, • undernutrition
 - Types 
 - overnutrition (over eating)
 - undernutrition (low food intake, poor hygienic conditions, infections)
-

- Various problems of **malnutrition** and their clinical features.



- Possible control measures in each case.

28.10 TERMINAL QUESTIONS

1. Name the disease that gives "Moon face" to the children.
2. What is the full form for the following :
 - (i) VAD
 - (ii) IDD
3. List two important symptoms for each of the following :
 - (i) Obesity
 - (ii) Corneal Xerosis
 - (iii) Nutritional anaemia
 - (iv) Goitre
4. What is 'Genu-valgum'.
5. Match the following :

(a) Xerophthalmia	(i) Thyroxine
(b) Cretinism	(ii) Iron
(c) Anaemia	(iii) Vitamin A
(d) Fluorosis	(iv) Iodine deficiency
(e) Goitre	(v) Chalky teeth

28.11 ANSWERS TO INTEXT QUESTIONS

- 28.1**
1. (c)
 2. (d)
 3. (a)
 4. Refer Text
 5. Protein energy Malnutrition
 6. Marasmus and Kwashiorkor
 7. Refer Text
 8. Refer Text
- 28.2**
1. Vitamin A
 2. In dim light
 3. Conjunctiva
 4. Conjunctiva
 5. Keratomalacia
 6. 1,00,000 IU
 7. 2,00,000 IU
 8. 9 doses
 9. Animal -Milk, Butter, Cheese, Vegetable, Papaya, Green leafy vegetables (There are more such foods providing vitamin A)
 10. Refer Text
 11. Refer Text
- 28.3**
- | | | | | | |
|-------|-----|--------|-----|-------|-----|
| (i) | (a) | (ii) | (c) | (iii) | (b) |
| (iv) | (a) | (v) | (c) | (vi) | (a) |
| (vii) | (b) | (viii) | (d) | (ix) | (a) |
- 28.4**
- | | | | | | | | | | |
|----|-----|----|-----|----|-----|----|-----|----|-----|
| 1. | (c) | 2. | (c) | 3. | (b) | 4. | (a) | 5. | (c) |
|----|-----|----|-----|----|-----|----|-----|----|-----|
- 28.5**
- | | | | | | | | |
|----|-----|----|-----|----|-----|----|-----|
| 1. | (a) | 2. | (b) | 3. | (a) | 4. | (a) |
|----|-----|----|-----|----|-----|----|-----|