

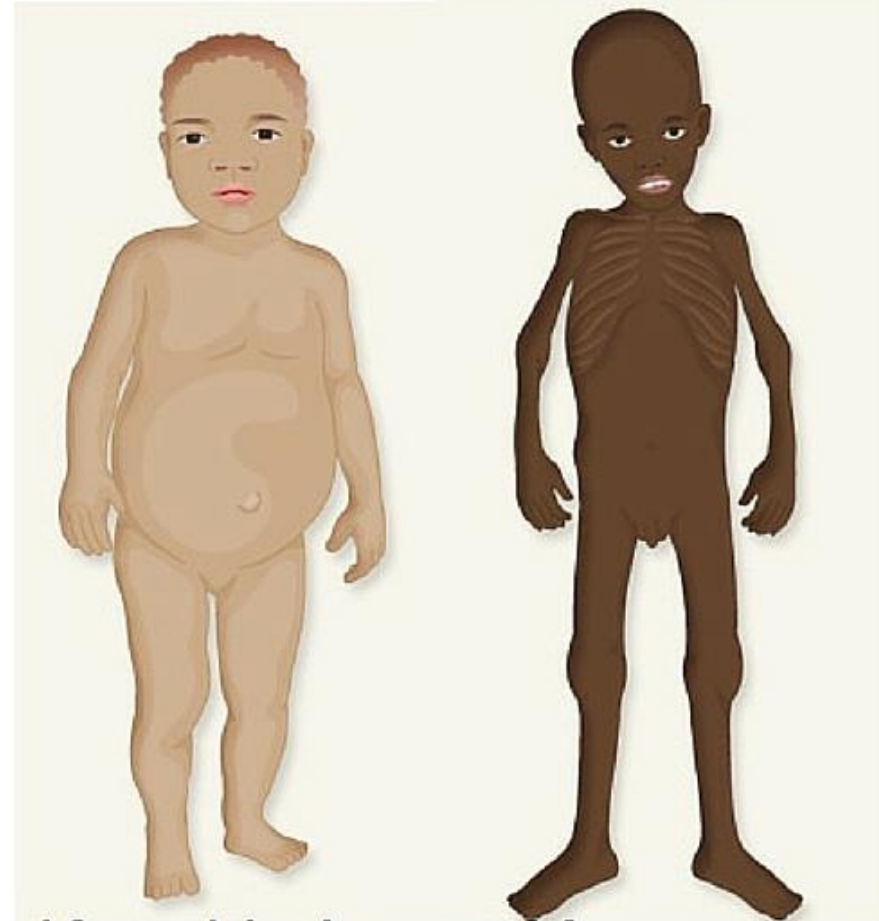
Malnutrition Disorders

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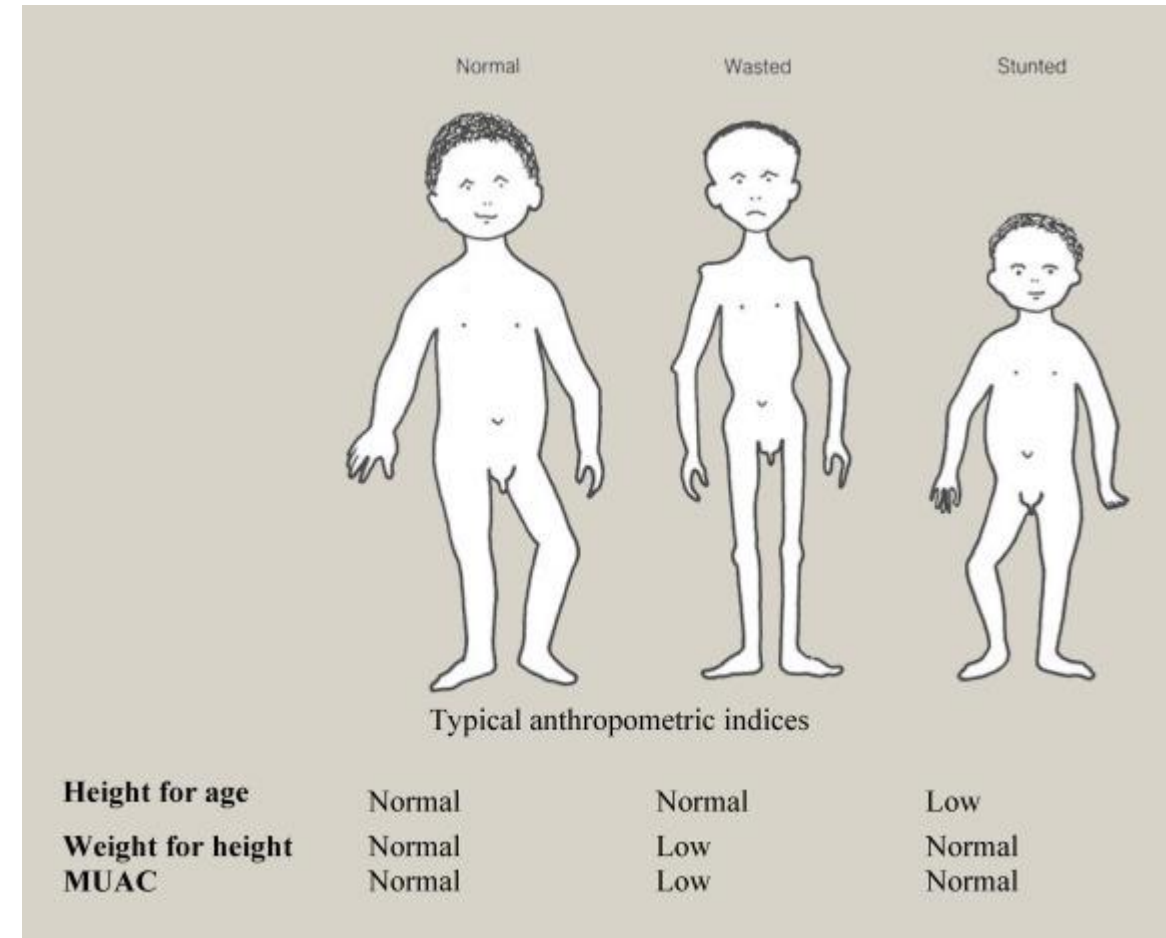
Nutrition



Kwashiorkor vs Marasmus

Malnutrition Disorders

- **Malnutrition** is the **dietary condition** resulting from the **lack of foods necessary for health**. It can also be said that malnutrition is nothing but **insufficient nutrition**.
- **Nutrition** is the **process** of **providing** or **receiving** **nourishing** **substances**.
Nutrition also means **food** or **nourishment**.



Malnutrition Disorders

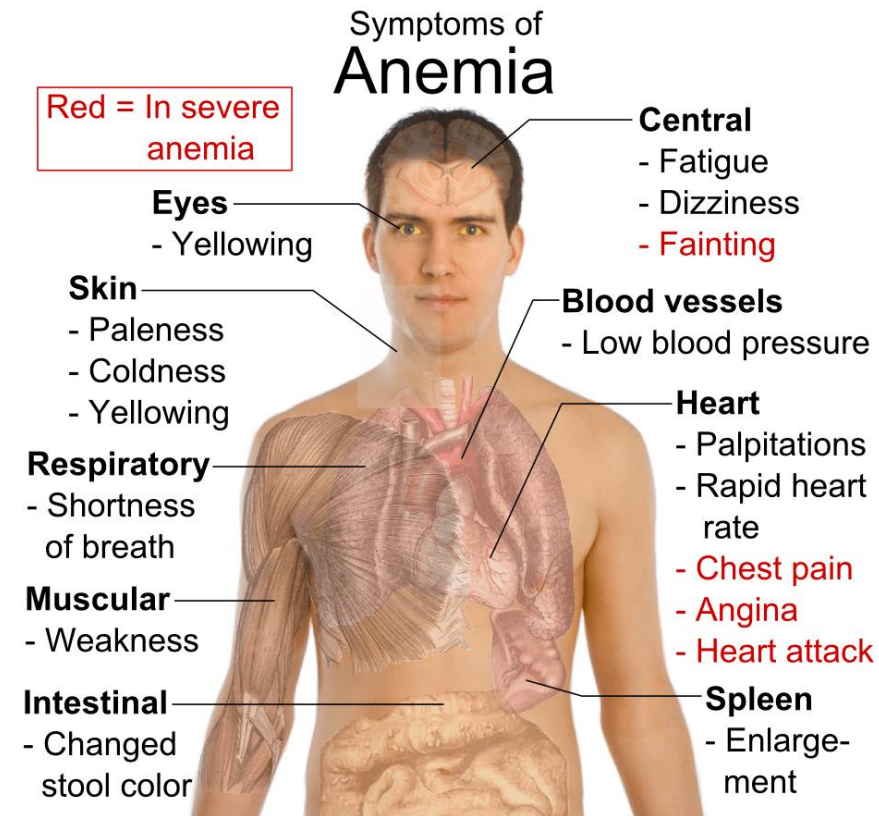
- **Malnutrition** is, therefore, a condition resulting from **improper diet**. The diet or the food **contains** nutrients such as **carbohydrate, protein, fat, minerals, vitamins** and of course water.
- The **major nutrients** like **carbohydrates and fats** are the main organic molecules used as fuels.
- **Malnutrition causes a number of disorders or diseases in human beings**. Let us discuss a few of these malnutrition disorders.

Malnutrition Disorders

1. Anemia (B12 AND Iron Deficiency)
 2. Rickets
 3. Marasmus
 4. Goiter
 5. Kwashiorkor
- (Cause, Symptoms, Precaution and Remedy)

1. Anemia (B12 AND Iron Deficiency)

- Anemia is a kind of **disorder characterized by deficiency of hemoglobin in the blood**, either due to **less number of red blood cells (erythrocytes) or deficiency of hemoglobin in individual red blood cells.**
- **Hemoglobin consists of a complex protein molecule, globin and a non-protein portion** which contains iron.
- In **normal adult male**, 100 ml of blood contains **14-18 g of hemoglobin**, and in **a female**, it is **11.5 to 16 g.**
- In **one red blood cell**, there are **600 million molecules of hemoglobin.** The **red blood cells carry oxygen** to different parts of the body.



Anemia (B12 AND Iron Deficiency)

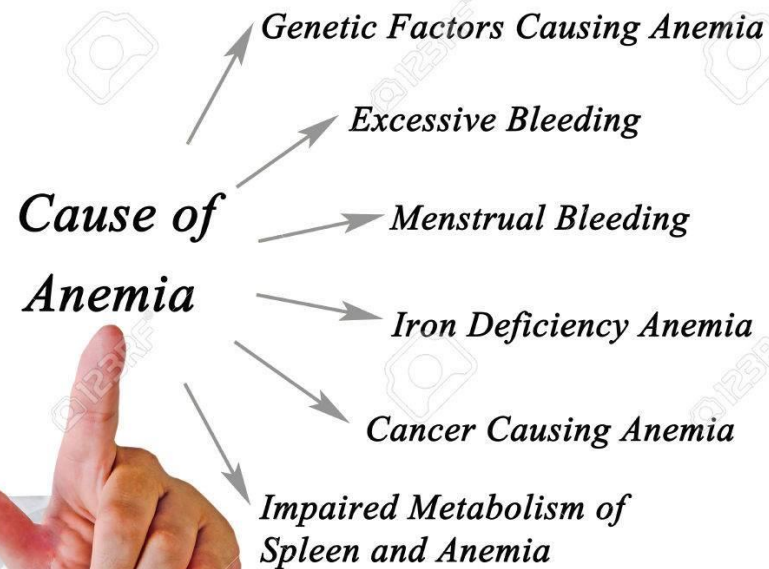
➤ Causes of Anemia:

➤ Anemia may be caused due to different reasons and accordingly they are classified differently as follows:

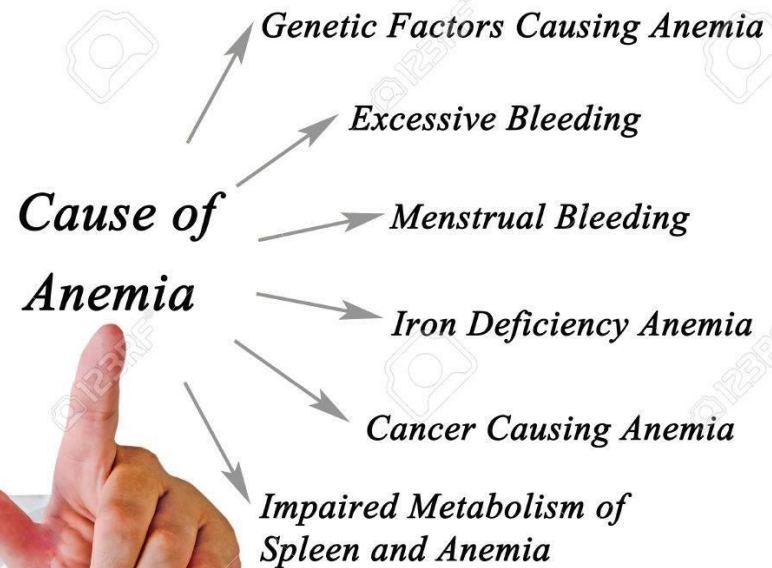
➤ **Nutritional anemia** - caused due to deficiency in some nutrients.

➤ **Aplastic anemia** - caused due to failure of bone marrow to produce enough red blood cells. **(Hematopoiesis)**

➤ **Haemolytic anemia** - caused by excessive destruction of red blood cells. **The anemias caused due to deficiency of vitamin B12 and iron.**



Anemia (B12 AND Iron Deficiency)



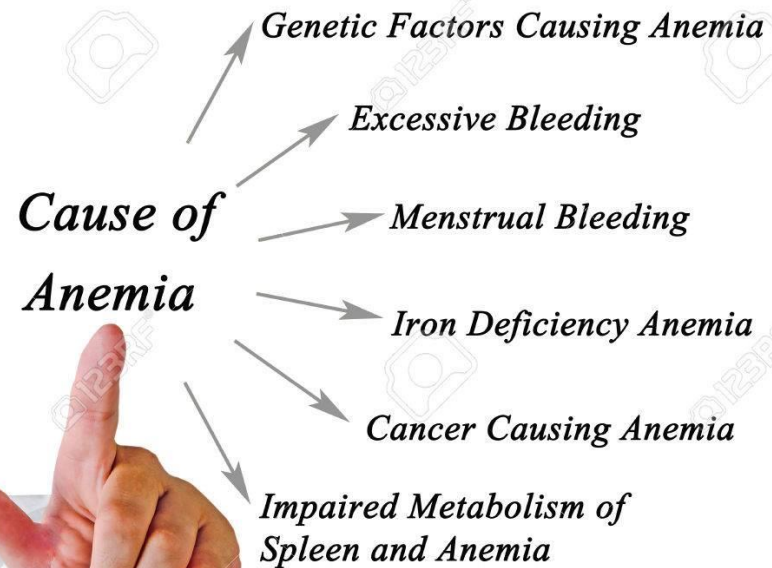
➤ **Nutritional anemia** : It is **caused** mainly due to **deficiency** of different **nutrients** such as **iron, vitamin B12, foliate (folic acid), vitamin C** and due to some other reasons.

➤ Nutritional anaemia is again classified into **three types,**

- i. **Microcytic anaemia,**
- ii. **Macrocytic anaemia**
- iii. **Normocytic anaemia.**

Anemia (B12 AND Iron Deficiency)

Nutritional anaemia



- i. **Microcytic anemias** - these are **caused due to deficiency of some nutrients**. One example of this type of anemia is iron-deficiency anemia.
- ii. **Macrocytic anemias** - these are **caused due to vitamin B12 deficiency**
- iii. **Normocytic anemias** - are **caused by blood loss due to many reasons**. A common cause is vitamin E deficiency.

Anemia (B12 AND Iron Deficiency)

Vitamin B12 Deficiency Anaemia

Cause

- This kind of anemia is a macrocytic. It is caused due to deficiency of vitamin B12.
- In this case, the development of red blood cells is either stopped or reduced due to deficiency of vitamin B12.
- Vitamin B12 deficiency can be caused due to insufficient diet or insufficient presence of a substance.

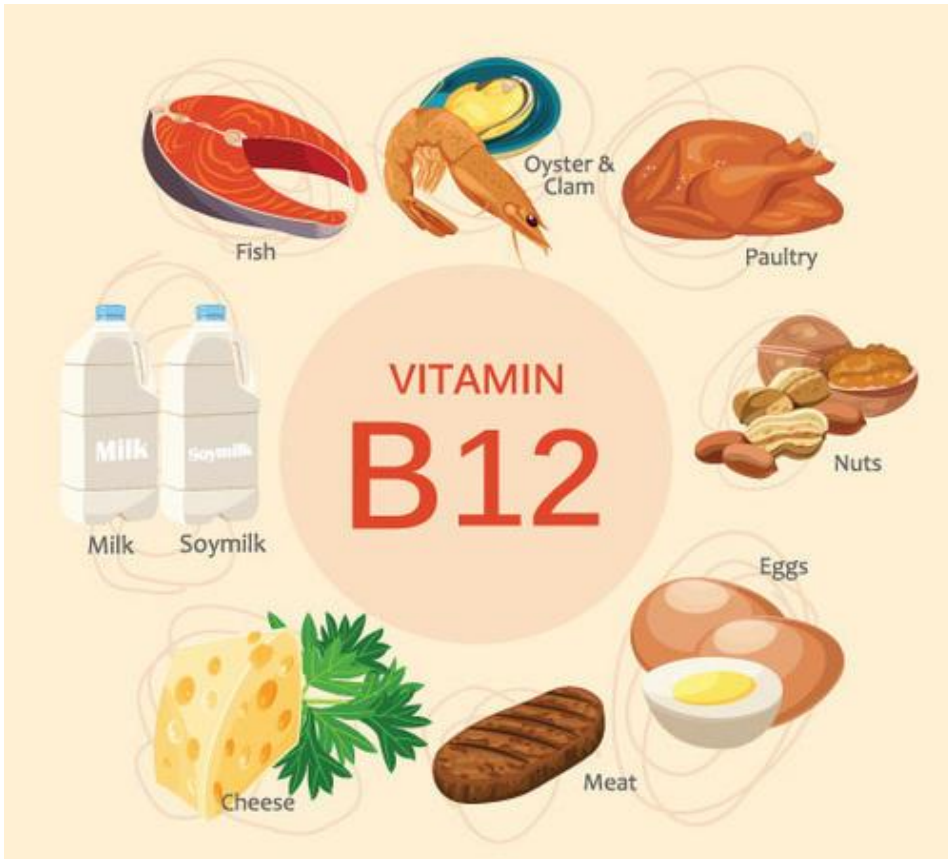


Anemia (B12 AND Iron Deficiency)

Vitamin B12 Deficiency Anaemia

Symptoms

- 1. Fatigue and weakness
- 2. Paleness that is finely colored palms of the hand.
- 3. Tongue appears smooth, red and sore.
- 4. Depression.
- 5. Blood test shows low level of hemoglobin.
- 6. Analysis of blood cells shows very few red blood cells and the cells are abnormally large
- 7. In severe cases, there may be decline the nervous system resulting in emotionlessness and scratchy in the limbs



Anemia (B12 AND Iron Deficiency)

Vitamin B12 Deficiency Anaemia

Precaution



- 1. It cause due to deficiency of vitamin B12, care must be taken to take vitamin B12 in adequate amount particularly to the children.
- **Requirement - Child- 2 μg , Adult – 3 2 μg per day**
- 2. Any symptom such as sign of fatigue, weakness paleness of the palms of the hand, eye and lips particularly in case of children should not be neglected, otherwise the consequences may become very serious.
- 3. A physician must be consulted immediately

Anemia (B12 AND Iron Deficiency)

Vitamin B12 Deficiency Anaemia

Remedy



- 1. The affected individual should be **treated by a physician at the earliest.**
- The usual treatment is **regular injections** of small amounts of **vitamin B12** for a long time, and in some cases for the person's lifetime.
- 2. The **diet should include milk and milk products like cheese, fish, eggs, red meat and chicken** depending on the weather the person is a vegetarian or non-vegetarian

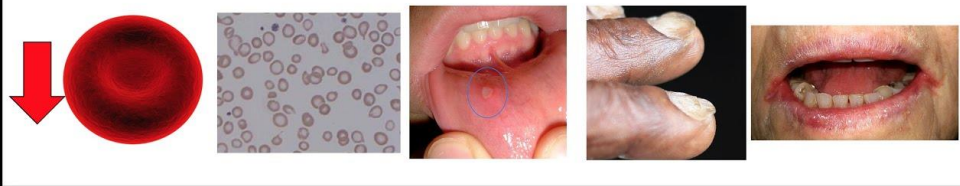
Anemia (B12 AND Iron Deficiency)

Iron Deficiency Anaemia

Cause

- Iron deficiency anemia is a **type of microcytic anemia** which is a kind of nutritional anemia.
- It is **caused due to deficiency of iron** in the body.
- Iron is **needed for the production of haem** which is a component of hemoglobin that carries oxygen.
- Anemia **occurs only after all the stored iron in the body** is used up.
- Iron deficiency anemia is the **most common anemia** throughout the world.
- It is the major cause of anemia during childhood. It is **very common among children** up to about 15 years of age.

Iron Deficiency Anemia



Anemia (B12 AND Iron Deficiency)

Iron Deficiency Anaemia

Cause

- Iron deficiency anemia is also **common in women** **because** of increased demands for iron during pregnancy and also **due to blood loss at the time of menstruation**.
- In adult men, the most common cause of iron deficiency is the loss of blood due to diseases of the **stomach or intestine**, such as **peptic ulcers**.
- The loss of red blood cells due to hemorrhage (The release of blood from a broken blood vessel, either inside or outside the body.) **also results in loss of iron**.

Iron Deficiency Anemia



Anemia (B12 AND Iron Deficiency)

Iron Deficiency Anaemia

Symptoms

- 1. Weakness, fatigue and irritability.
- 2. Paleness of the skin.
- 3. Depression
- 4. If the loss of iron is due to internal bleeding, blood will be present in the faeces.
- 5. Analysis of blood cells shows very small sized red blood cells containing insufficient hemoglobin

Iron Deficiency

Anemia



Anemia (B12 AND Iron Deficiency)

Iron Deficiency Anaemia

Precaution

- 1. It is important to make sure that the diet contains plenty of iron-rich foods.
- 2. A good source of haem iron is chicken, lean red meat, fish and many sea foods.
- Iron is present in large quantities in liver, kidney and heart.
- A number of vegetables such as legumes (beans, chickpeas and lentils), cereal grains and whole grain, dark green vegetables including cabbage and broccoli, nuts and seeds contain iron.

Iron Deficiency

Anemia



Anemia (B12 AND Iron Deficiency)

Iron Deficiency Anaemia

Precaution

- 3. The average daily requirement of iron is about 15 mg. During pregnancy it is about 20 mg per day. For children, the amount is 8-12 mg depending on the age.

Remedy

- 1. The affected individual must be treated by a physician immediately.
- 2. The usual treatment of iron-deficiency is to take extra iron in the form of tablets.
- 3. If the person is not able to take iron orally because of some intestinal disorder, he is administered iron by giving injections.
- 4. The diet should include plenty of iron-rich foods.

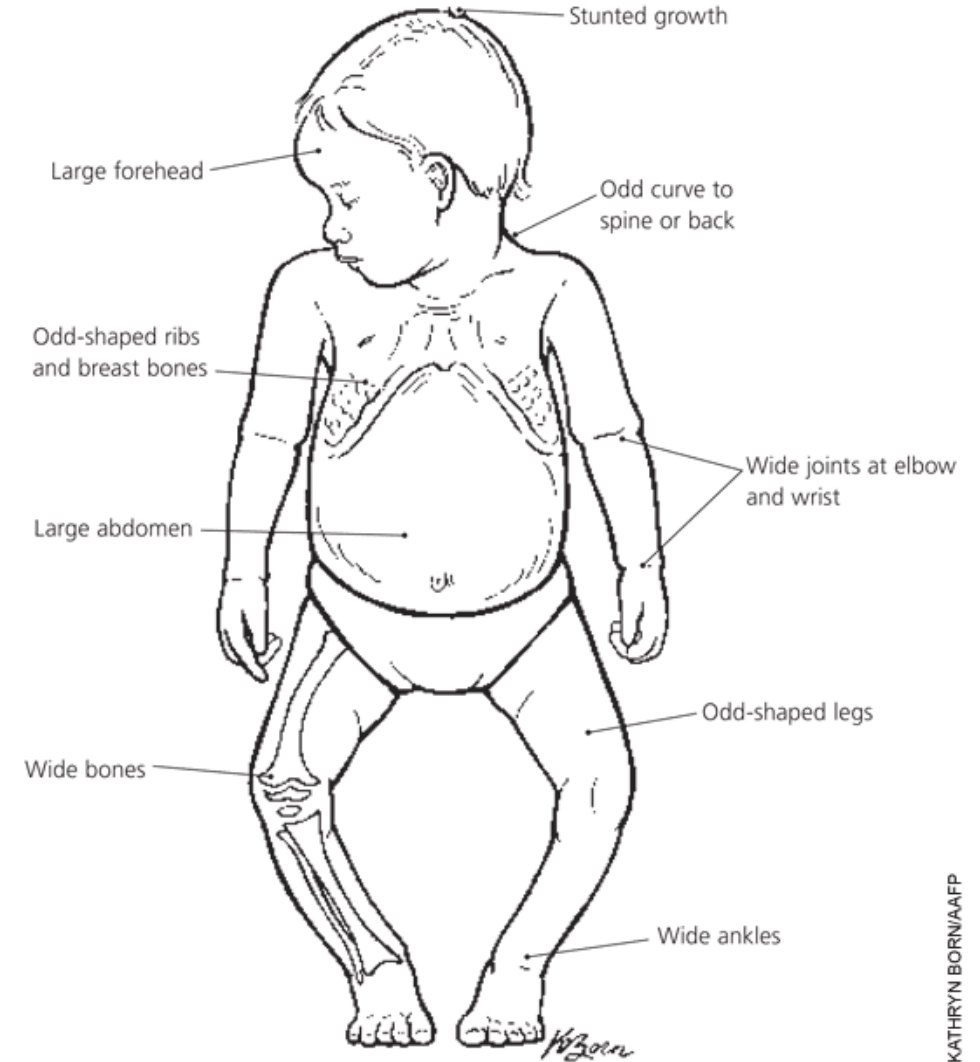
Malnutrition Disorders

RICKETS

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KATHRYN BORNIAAFP

2. Rickets

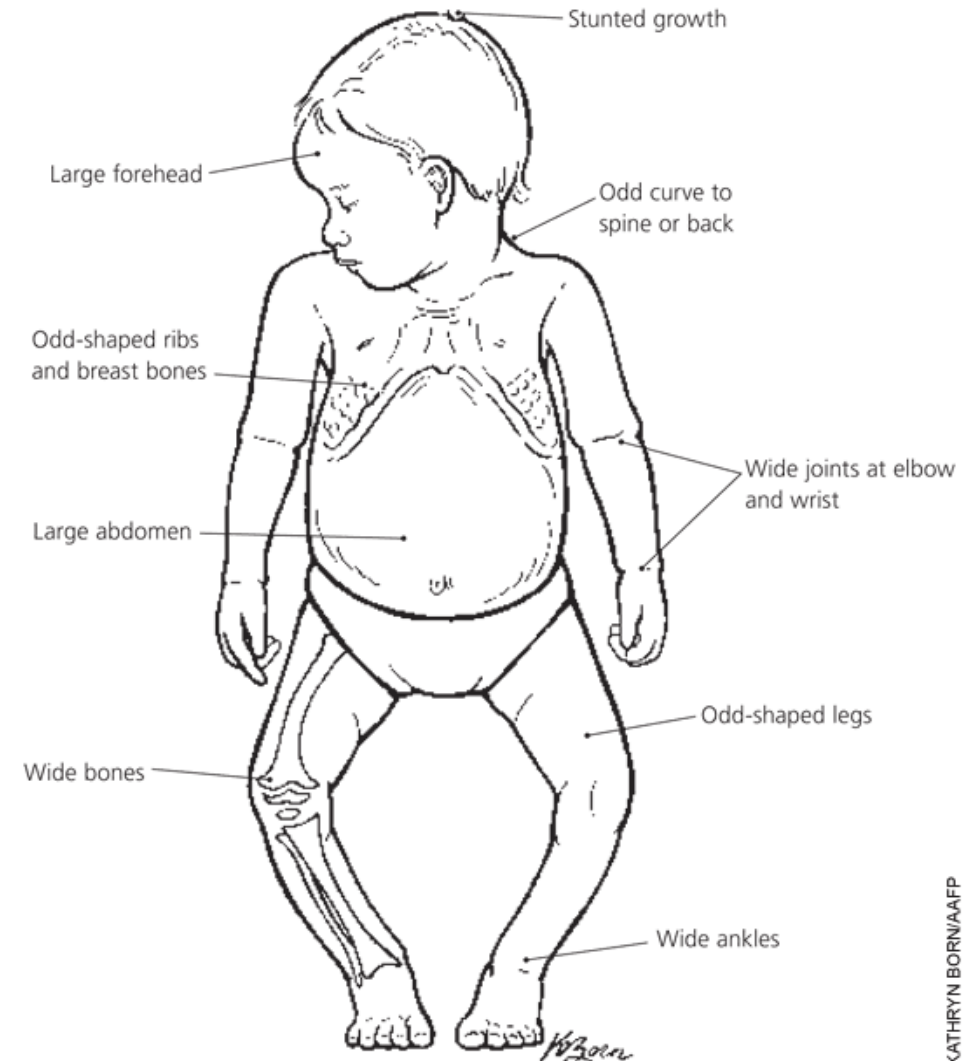
- Rickets is a kind of disorder in which there is defective growth of bone.
- It occurs due to lack of vitamin D in the body.
- Lack of vitamin D may happen either due to less supply of the vitamin in the diet or renal failure or less exposition to sunlight.
- The rickets is classified broadly into 2 types –
 1. Nutritional Rickets
 2. Renal Rickets
- Nutritional rickets is caused due to lack of vitamin D in the diet, and renal rickets is caused due to renal failure.

Rickets

➤ Nutritional Rickets

➤ Cause

- It is caused due to lack of vitamin D in the diet and also due to less exposure to sunlight.
- Vitamin D is needed for absorption of calcium and phosphate, as well as deposition of calcium and phosphate in bone.
- These functions are performed by
 - i) increasing uptake of calcium by stimulating the intestinal absorption of calcium and phosphate.
- This is a complex process but in short, calcium uptake is increased by increased synthesis of a specific calcium-binding protein.

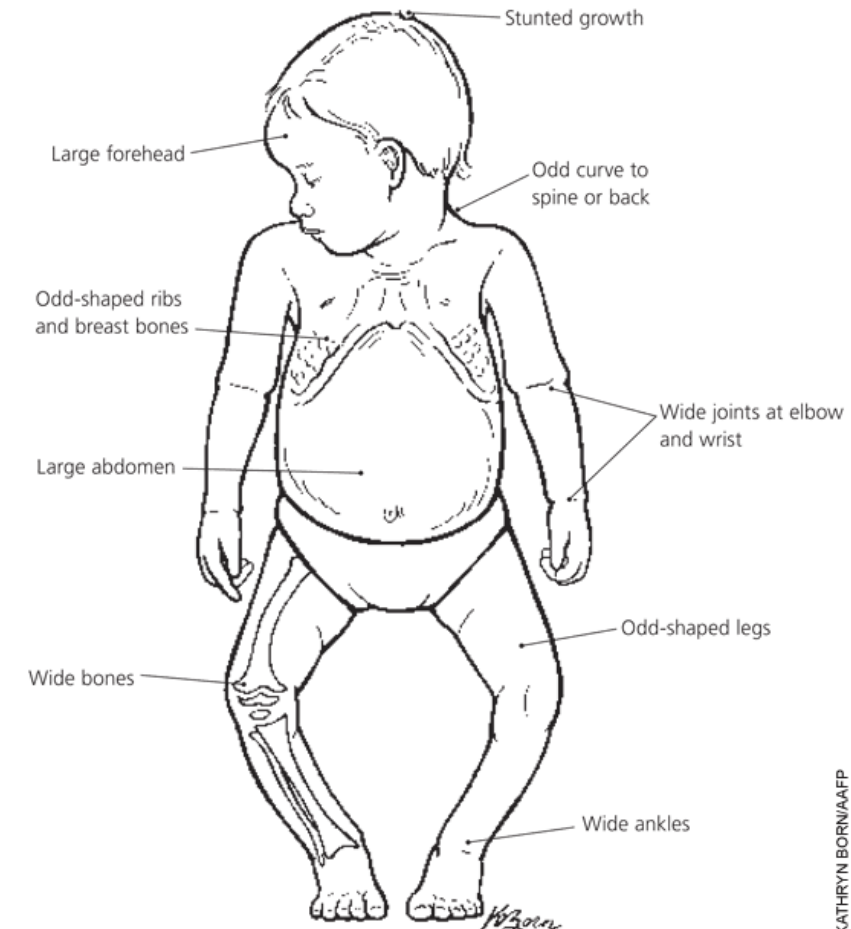


Rickets

➤ Nutritional Rickets

➤ Cause

- ii) by **stimulating** the mobilization of **calcium and phosphate from bone** by some process with the help of **parathyroid hormone (PTH)**.
- Due to this, an **increase in plasma calcium** and phosphate results.
- Thus, even **if there is enough calcium in the diet**, uptake of calcium by the intestine will be affected in the **absence** of sufficient quantity of **vitamin D**.
- **Less exposure to sunlight** is another cause of rickets because ultraviolet light (UV light) of sunrays act on the oils of the skin **to produce vitamin D**, which is then absorbed into the body.

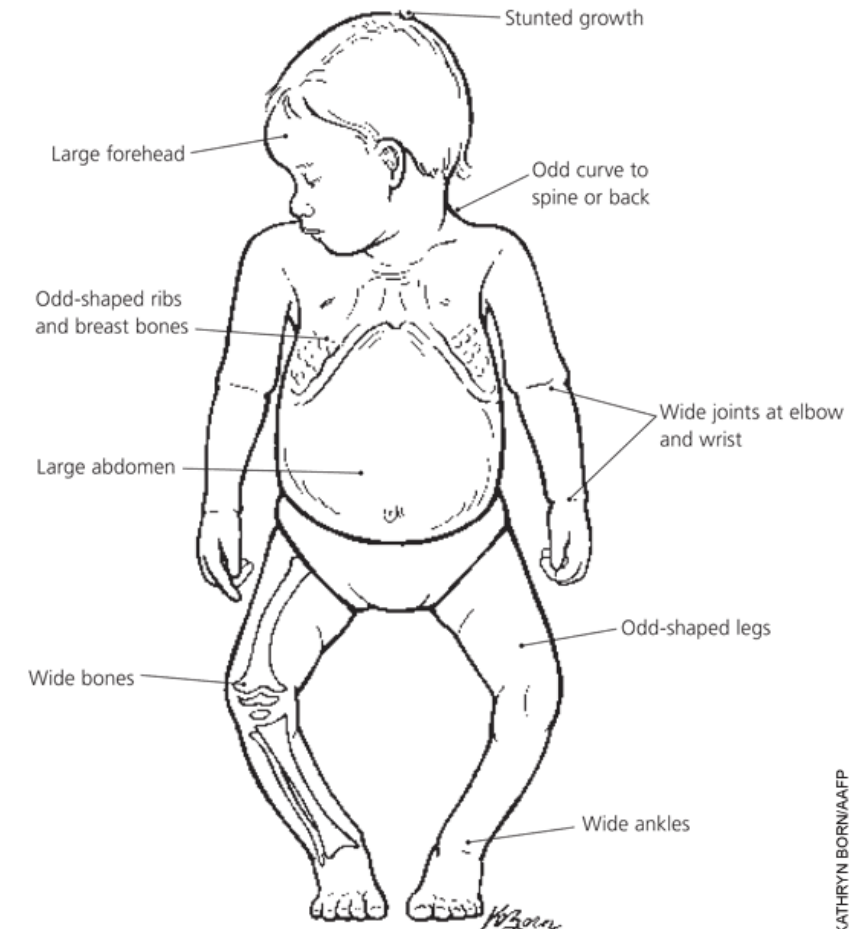


Rickets

➤ Nutritional Rickets

➤ Symptoms

- **1. Demineralization of bone takes place** and due to this, the **bones become soft and flexible.**
- **This condition in children is called rickets** and in **adults osteocalcin.**
- **2. The collagen matrix continue to grow but the bone becomes soft due to incomplete mineralization, that is, less deposition of calcium and phosphate.**
- **3. In children, the legs become bend,** somewhat bow-shaped.
- In adults, demineralization of pre-existing bones, increases and, therefore, the soft bones become more susceptible to fracture.

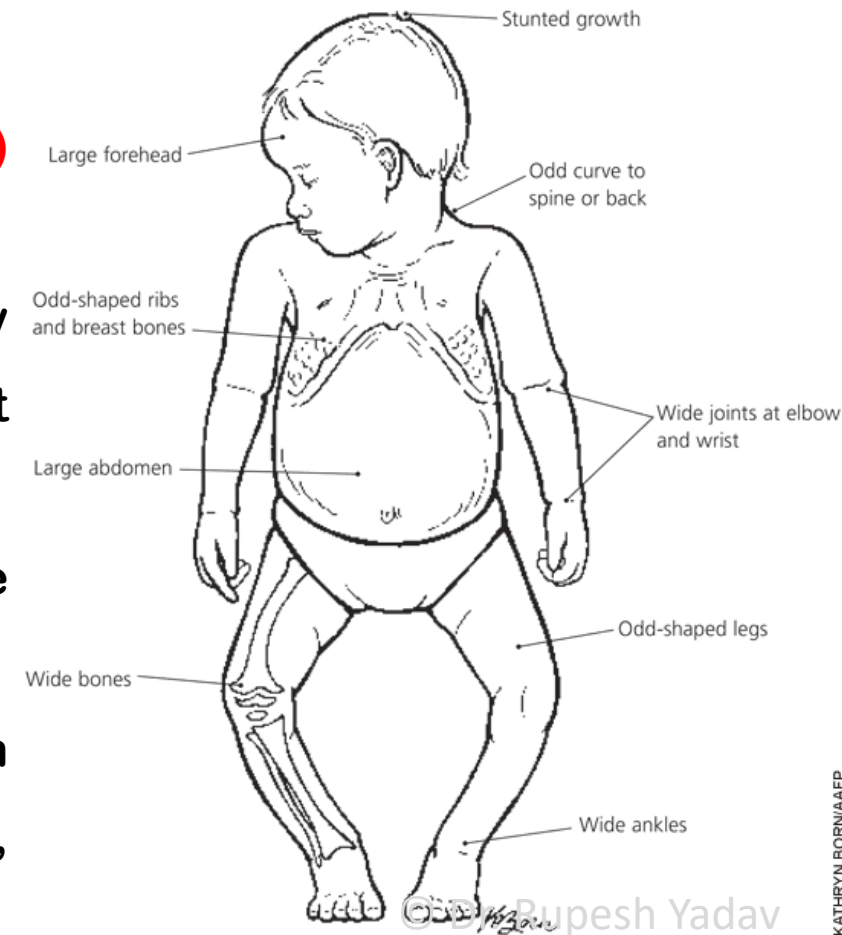


Rickets

➤ Nutritional Rickets

➤ Precaution

- 1. It must be seen that there is **enough supply of vitamin D along with the diet.**
- The **daily recommended dietary allowance (RDA) is 5-10 mcg (ug) or 200-400 IU**(International Unit) of vitamin D.
- 2. A little higher RDA up to 800 IU has been recommended by some to prevent fracture of bone but it must be remembered that vitamin D is highly toxic.
- As in the case of other fat-soluble vitamins, vitamin D can be stored in the body. It is metabolized very slowly.
- 3. **High doses of vitamin D may even cause hypercalcemia**, which can lead to deposition of calcium in many organs such as kidney, liver, lungs, stomach and even in the walls of blood vessels.

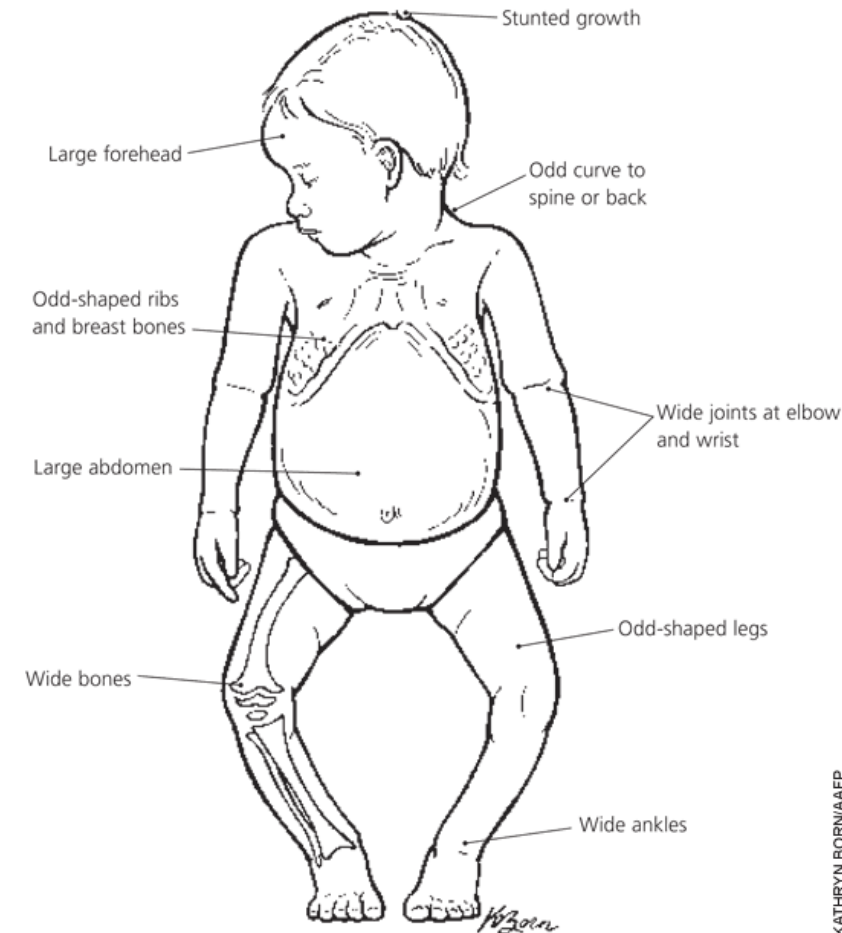


Rickets

➤ Nutritional Rickets

➤ Remedy

- 1. The **diet should contain the amount of vitamin D** as per RDA, that is, 5-10 ug or 200-400 IU of vitamin D daily.
- 2. The **good source of vitamin D is fish** (fatty fish) such as sardines, tuna and similar fishes, fish liver oil, egg, milk and dairy products.
- 3. A supplement of **daily 400 IU vitamin D capsules** to the affected person has been recommended by some physicians and authors.
- 4. Persons living in areas of high smog density should take adequate vitamin D in the diet since formation of **vitamin D in the skin** may be affected due to exposure to less sunlight.
- 5. Children should be given **D-fortified milk**.
- Those who do not drink such milk should be given more vitamin D along with other food.



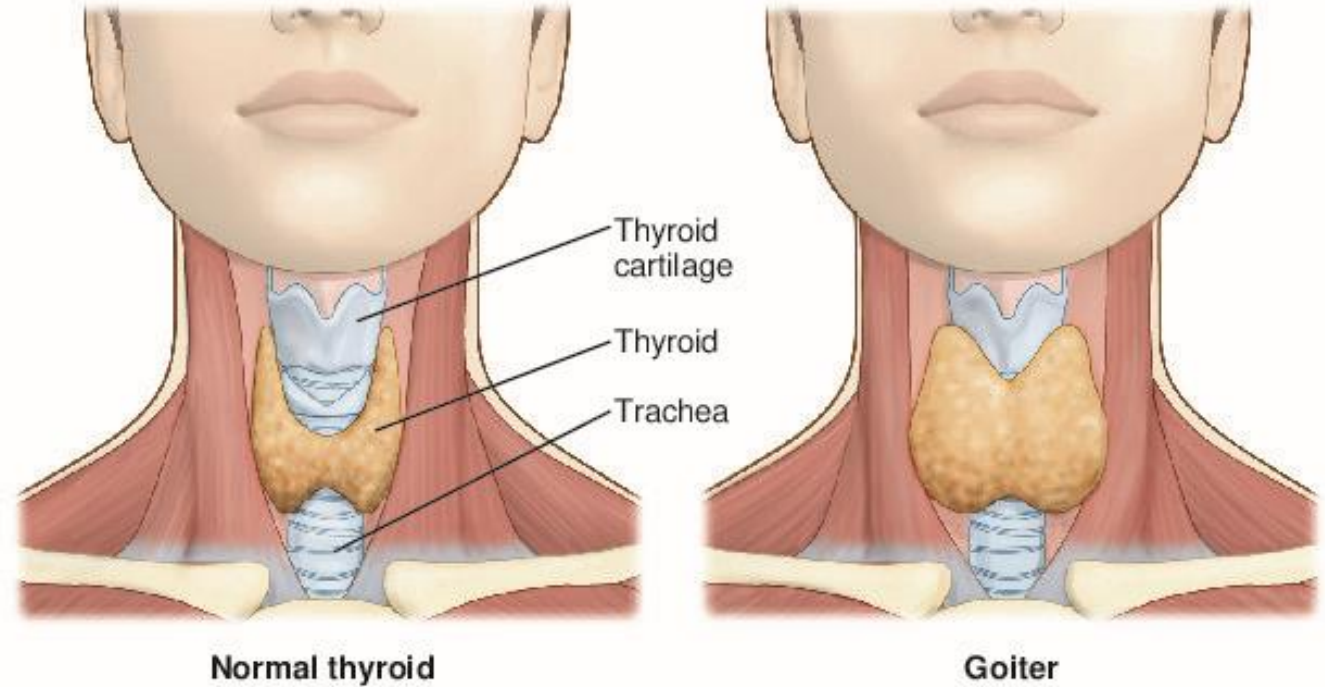
Malnutrition Disorders

GOITER

Dr. Rupesh B. Yadav

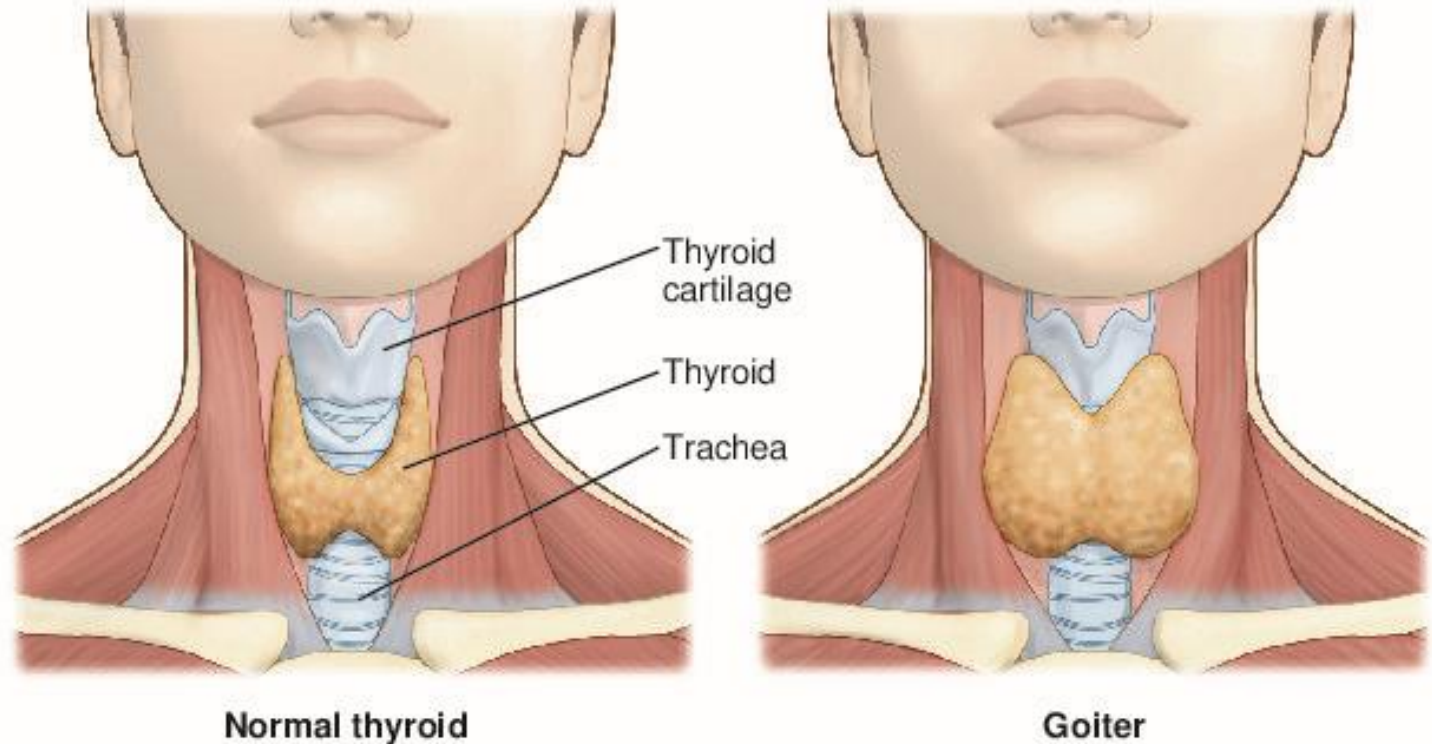
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GOITER

- Goiter is the **enlargement of thyroid**, an endocrine gland situated in the **neck region** surrounding the front part of the larynx and **upper part of the trachea**.



GOITER

➤ Cause

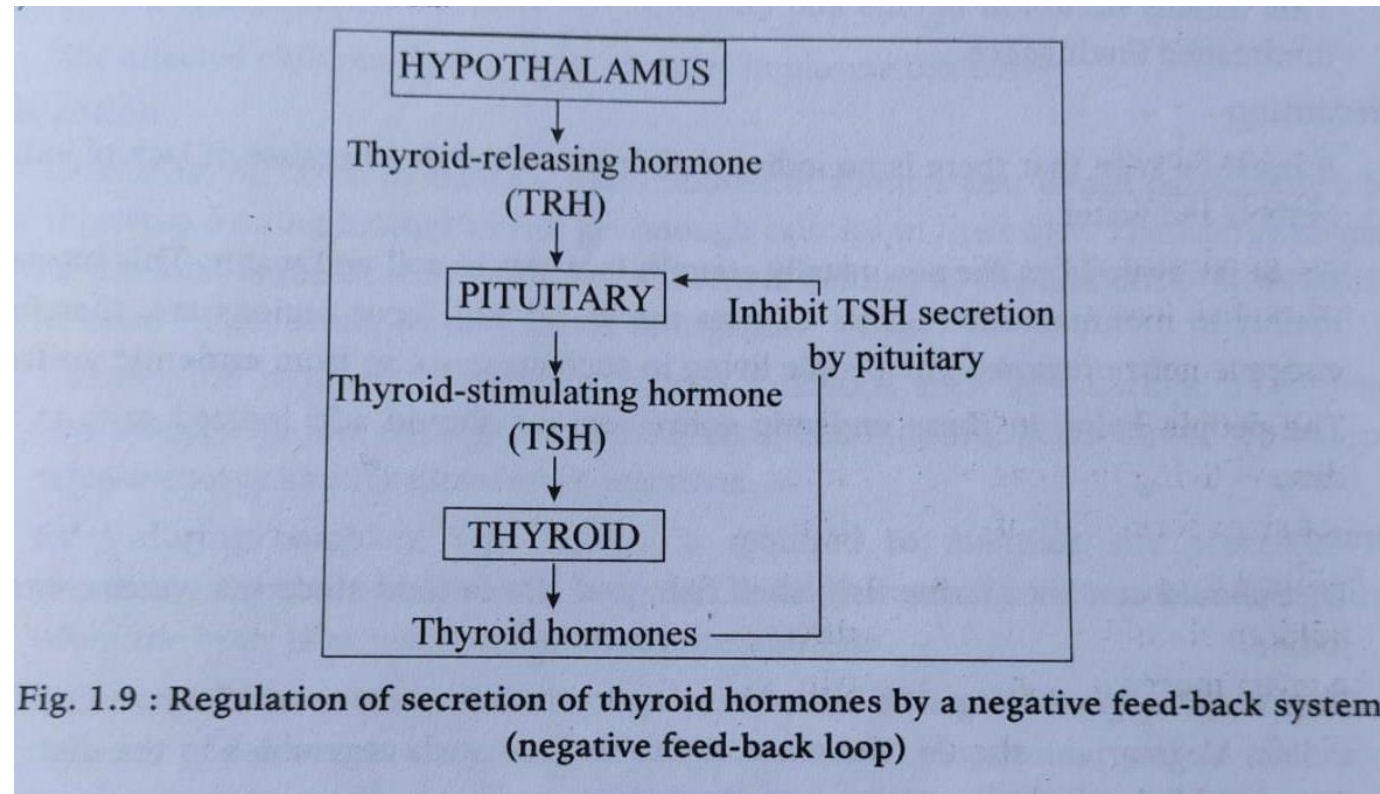
- Goiter appears due to enlargement of the endocrine gland, **thyroid**.
- The **thyroid** produces two hormones, **tri-iodothyronine (T3)** containing 3 iodine atoms, and **thyroxine (T4)** containing 4 iodine atoms.
- For the **production of these hormones** adequate quantity of **iodine is required**.
- **Iodine is absorbed from the food and transported to the thyroid by blood.**



GOITER

Regulation of secretion of Thyroid hormones

- The secretion of thyroid hormones is regulated by a negative feedback system (negative feedback loop).
- The neuro secretory neurons of the hypothalamus, a region of the brain below the cerebrum secrete thyroid releasing hormone (TRH) into the vein connecting the hypothalamus to the pituitary gland, a major endocrine gland situated in the center of the brain.



GOITER

Regulation of secretion of Thyroid hormones

- **TRH stimulates the pituitary gland to release thyroid stimulating hormone (TSH) into the blood.**
- **TSH stimulates the thyroid gland to release thyroid hormones.**
- **As the concentration of thyroid hormone increases in the blood, it starts inhibiting the secretion of TSH by the pituitary, and thus, secretion of thyroid hormones is reduced.**

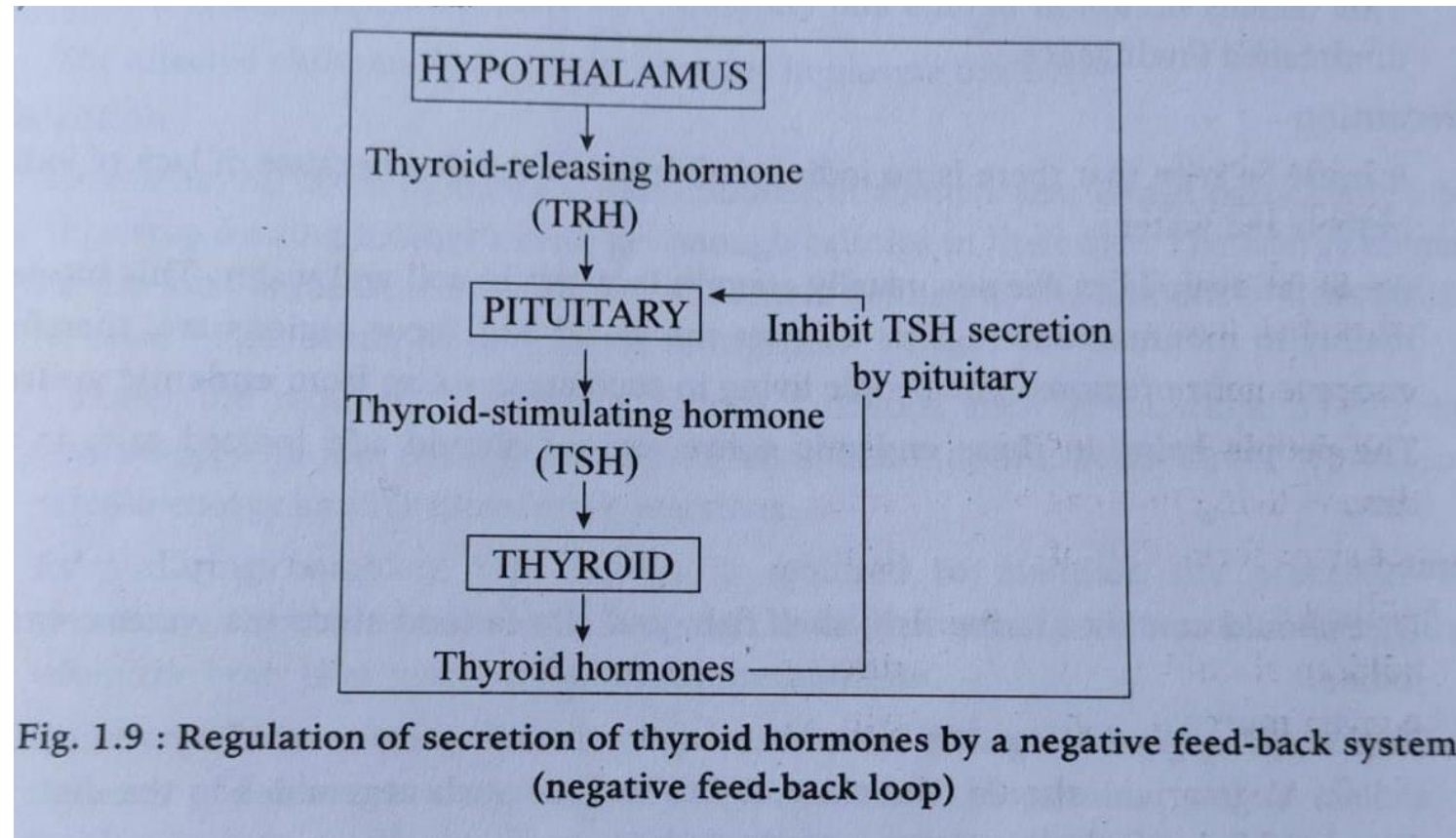
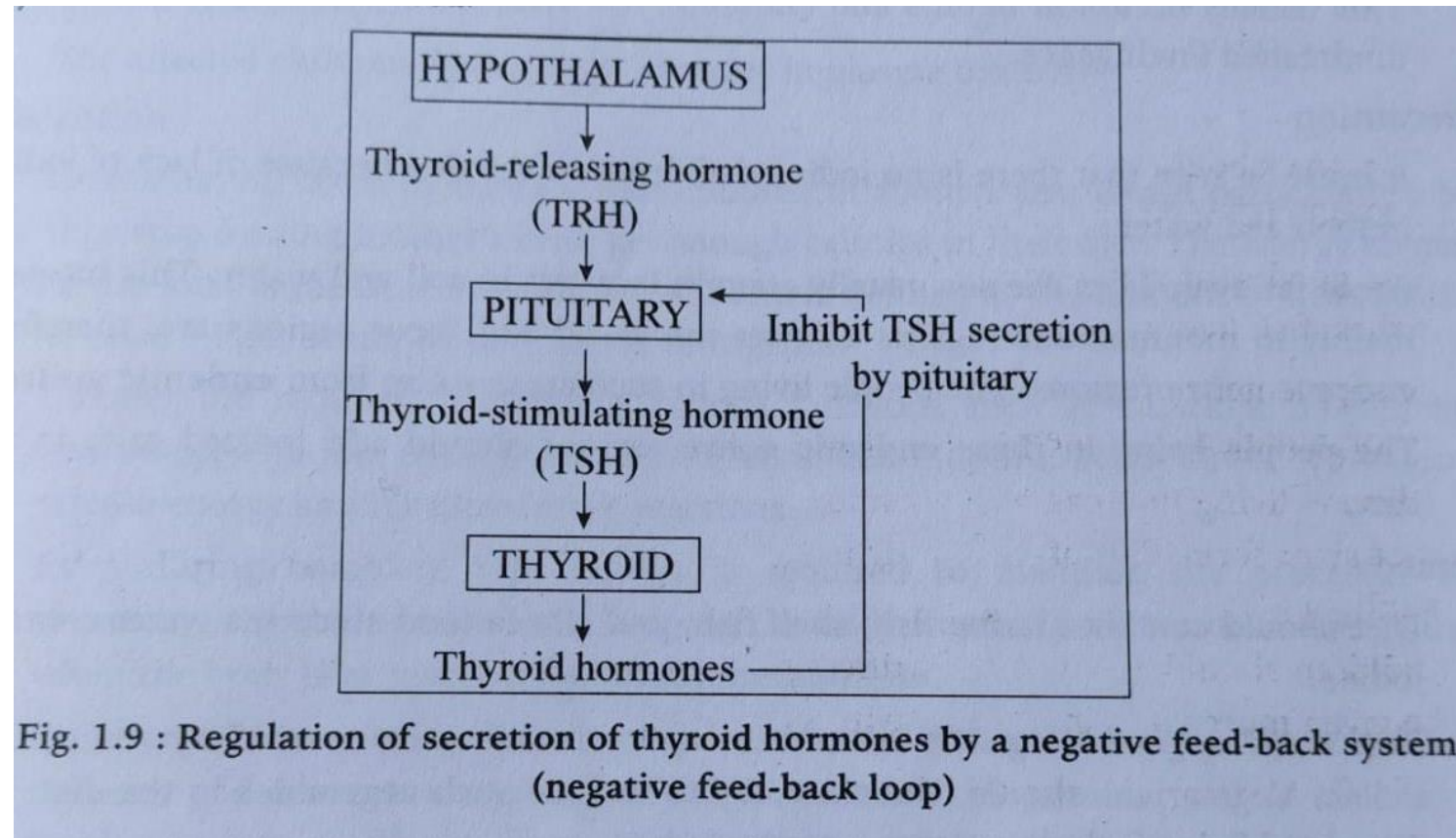


Fig. 1.9 : Regulation of secretion of thyroid hormones by a negative feed-back system (negative feed-back loop)

GOITER

Regulation of secretion of Thyroid hormones

- Now, in the absence of iodine, the thyroid gland cannot produce T3 and T4 in response to stimulation of TSH, because the concentration of thyroid hormones remains low.
- But secretion of TSH continues and therefore, thyroid gland grows in size and this results in the appearance of goiter.



GOITER

Symptoms

- 1. **Enlargement of the thyroid gland** seen as a **swelling on the neck.**
- A simple goiter which is caused due to lack of iodine can grow to an enormous size.
- 2. The other symptom includes metabolic disorder which leads to lack of energy, weight gain and mental retardation.
- 3. Deficiency of thyroid hormones or thyroid-deficiency in the adult may lead to the thyroid-deficiency disease known as myxedema



GOITER

Symptoms

- The disease **develops more commonly in middle-aged women.**
- The **symptoms are loss of appetite, loss of energy, weight gain, mental dullness, dry and puffy skin.**
- **4. Poor secretion of thyroid hormones may also lead to cretinism** , a mental retardation.
- This usually occurs in **infants and children.**
- The **symptoms are stunted growth and diminished intelligence.**



GOITER

Precaution

- 1. It must be seen that there is no iodine deficiency in the diet because of lack of iodine in food and water.
- 2. Areas far away from the sea usually contain less salt in soil and water.
- This happens mainly in mountainous regions all over the world and those regions are, therefore, endemic goiter regions.
- The people living in such areas suffer from endemic goiter.
- The people living in these endemic goitre regions should add iodized salts in the diet.

GOITER

Remedy

- **1. Diet should contain marine fish, shell fish, and all sea food since sea water contains iodine.**
- **Plants and vegetables grown near the sea or on soil once covered by sea contain iodine. Vegetarians should, therefore, try to include such vegetables in the diet. The diet should also include onions.**
- **2. People living in the mountainous regions must add iodized salt in the diet.**
- **3. The recommended daily allowance for iodine is usually 80–150 ug (mcg) adults. It is mostly calculated as 1 mcg per kg of body weight.**
- **The amount is 125-150 ug (mcg) for pregnant woman and nursing mother.**
- **4. Goitre can be corrected by taking iodine-enriched salt in the diet.**

Malnutrition Disorders

MARASMUS

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4. MARASMUS

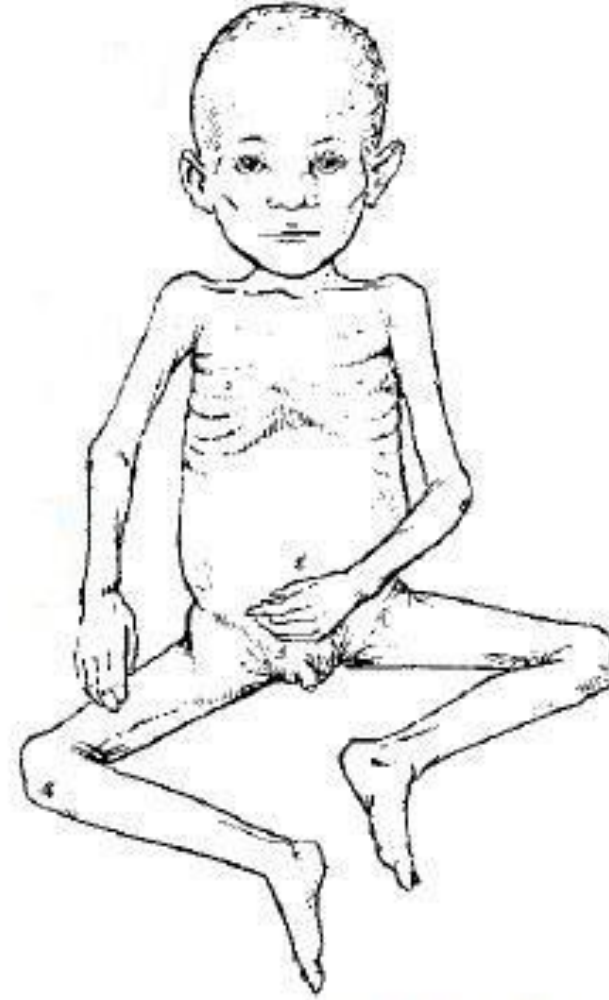
- Marasmus is a kind of disorder due to protein-calorie malnutrition.
- This kind of disorder is usually found in underdeveloped countries where inadequate intake of protein and/or energy is prevalent (Marasmus means "neglected child").



MARASMUS

Cause

- Marasmus results from chronic deficiency of calories and can occur in the presence of adequate intake of protein.

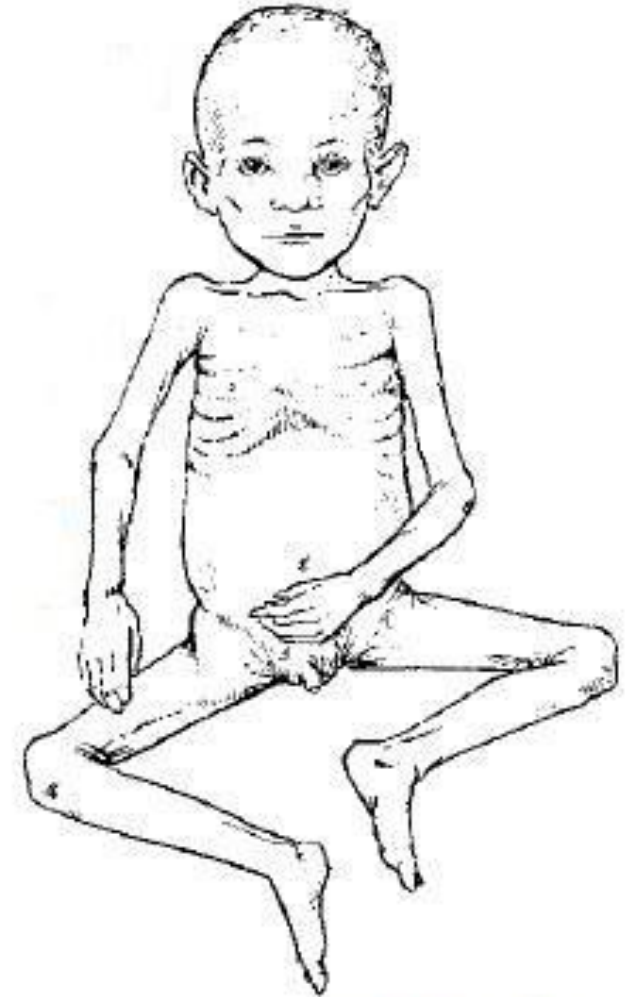


Marasmus

MARASMUS

Symptoms

- 1. Marasmus usually occurs in children (juveniles) below one year of age at the time when mother's breast milk is supplemented with some kind of watery gruels (liquid food of oatmeal etc.) of some cereals.
- These cereals may be some native cereals.
- 2. Typical symptoms are arrested growth, weakness, anemia and extreme muscle wasting (lean muscles).
- 3. Children affected by marasmus do not show any oedema (edema), that is, a condition characterized by an excess of watery fluid collecting in the cavities or tissues of the body.
- 4. The affected children do not show changes in plasma proteins.

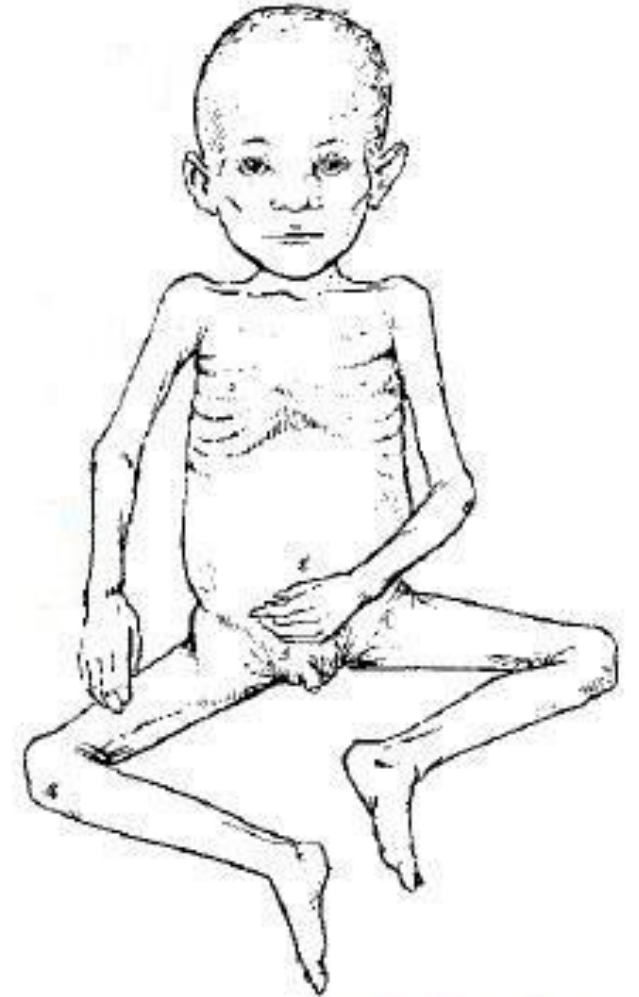


Marasmus

MARASMUS

Precaution

- 1. Care must be taken to see to it that children of about 1 year of age particularly after they stop feeding mother's milk get enough calories in their diet.
- The energy content of the food is measured in calories. Calorie is defined as the amount of heat needed to raise 1 kg of water by one degree centigrade.
- Calories are required to perform various functions such as muscular movements, heart beat, building tissues such blood, bone and muscles, break down of tissues to release energy and for many more reactions.

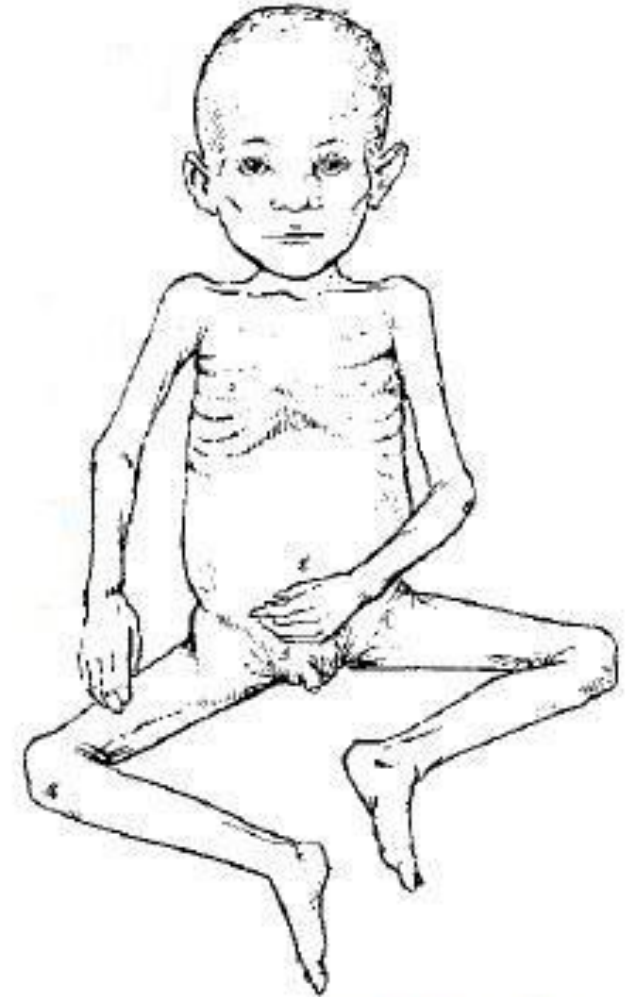


Marasmus

MARASMUS

Precaution

- Even during complete rest, energy is required to maintain life processes like breathing, circulating blood and keeping the body warm.
- The amount of energy used when the body is at rest is called basal metabolism.
- Children of 1 year of age usually requires about 1300 calories daily.
- Carbohydrates, proteins and fats provide energy which is measured in calories (cal) or kilocalories(kcal).
- Energy available from carbohydrate, protein and fat are 4 kcal/g for carbohydrate, 4 kcal/g for protein, and 9 kcal/g for fat.

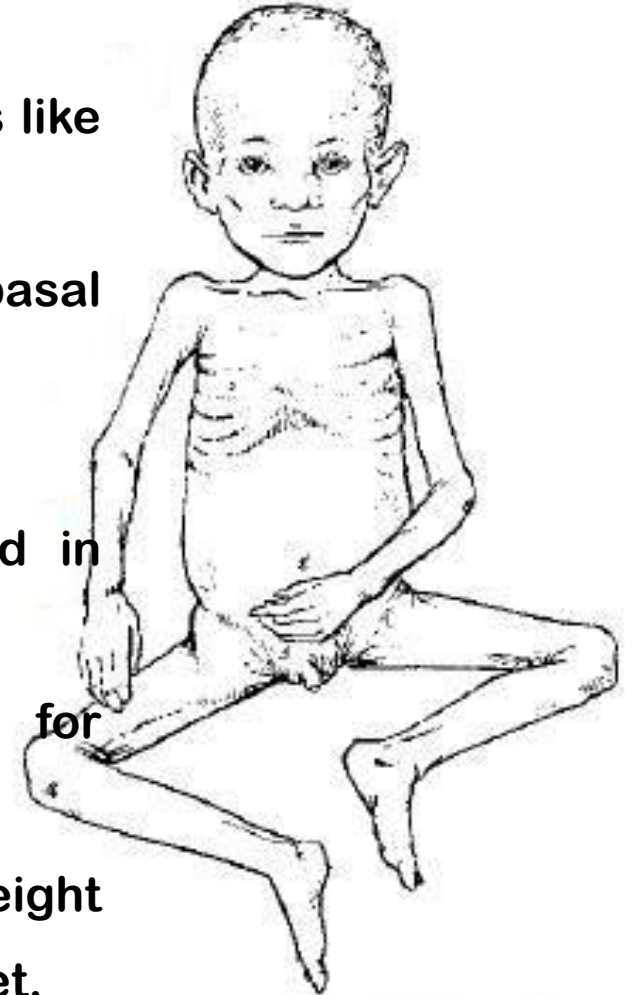


Marasmus

MARASMUS

Precaution

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- Energy available from carbohydrate, protein and fat are 4 kcal/g for carbohydrate, 4 kcal/g for protein, and 9 kcal/g for fat.
- 2. It must be remembered that the protein requirements per kg body weight are greater in infants. Therefore, there should be enough protein in the diet.



MARASMUS

Remedy

- The affected child should be given proper diet with enough protein and such foods that supply enough energy required by the child.



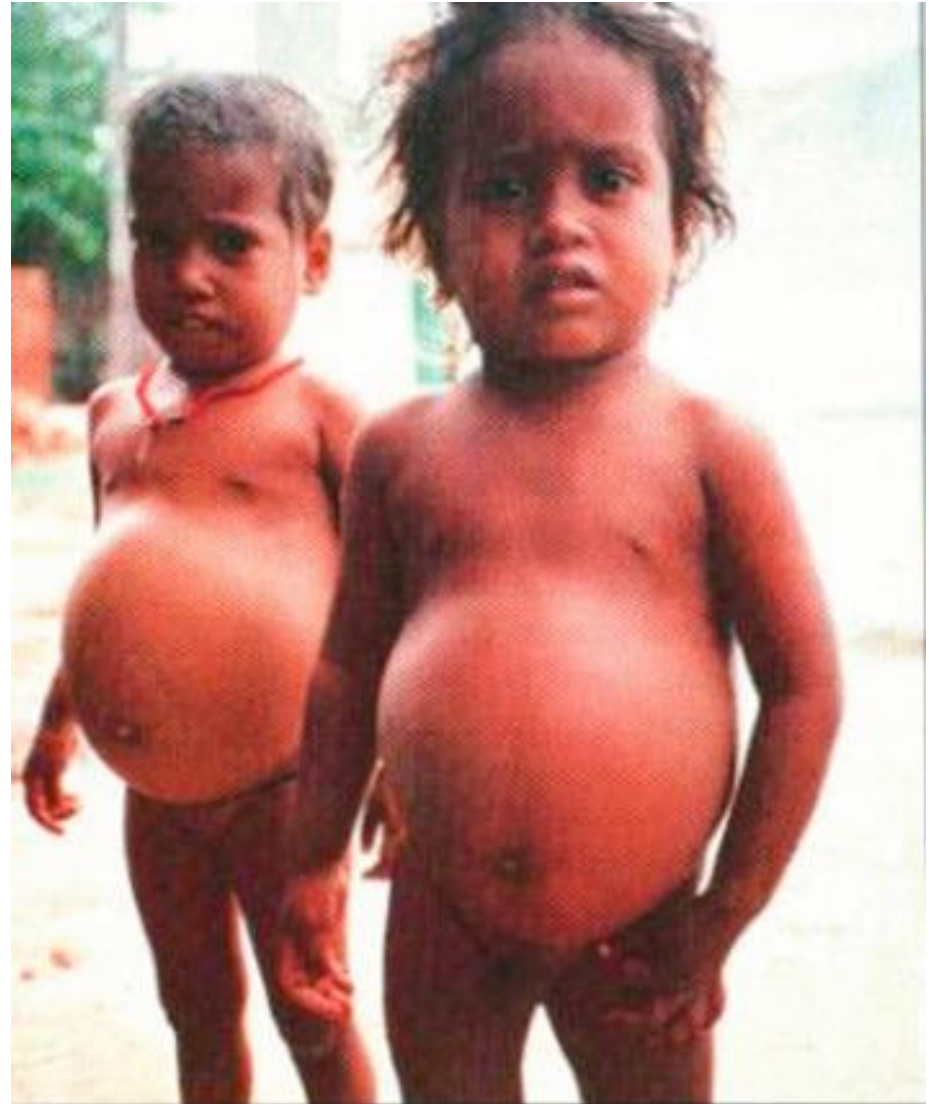
Malnutrition Disorders

KWASHIORKOR

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Kwashiorkor

- Kwashiorkor is also a disorder due to protein malnutrition.
- This kind of disorder is also observed in children in underdeveloped countries where intake of protein energy is inadequate.

Normal



Kwashiorkor



Kwashiorkor

Cause

- Kwashiorkor is caused by inadequate intake of protein in the presence of adequate intake of calories usually in children of about one year of age, when they stop feeding mother's milk and their diet consists mainly of carbohydrates.



Kwashiorkor

Symptoms

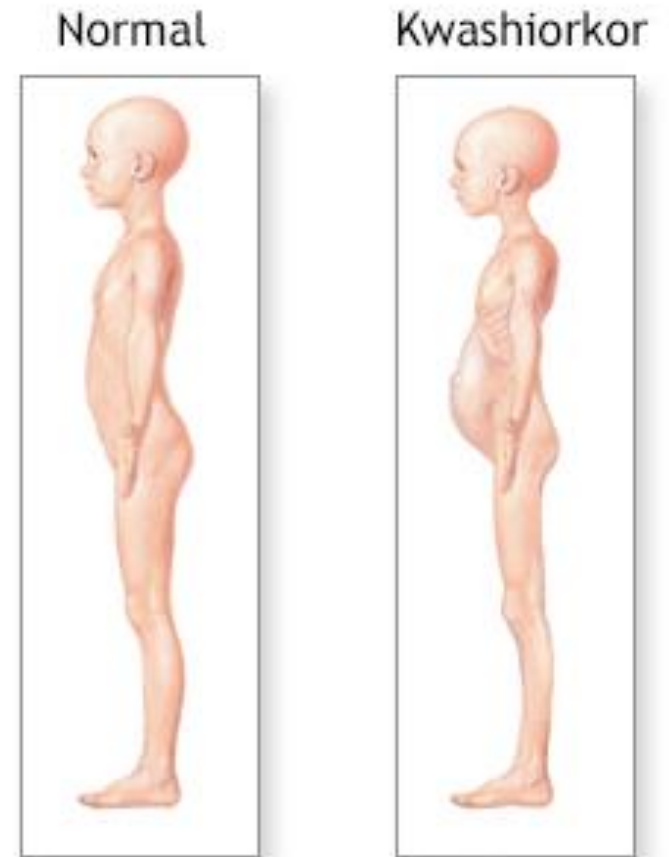
- 1. One of the typical symptoms is **formation of edema** a condition characterized by an excess of **watery fluid collecting in the cavities and tissues of the body**.
- Odema is formed due to **lack of adequate plasma proteins** that maintain the distribution of **water between blood and tissues**.
- 2. Due to Odema, a child with kwashiorkor often shows a falsely plump belly.
- 3. Other typical symptoms are **de-pigmented hair, skin lesions,** and **enlarged fatty liver**.
- 4. The affected **child suffers from anorexia**, that is, lack of desire to eat.
- 5. The **plasma albumin concentration is reduced**.



Kwashiorkor

Precaution

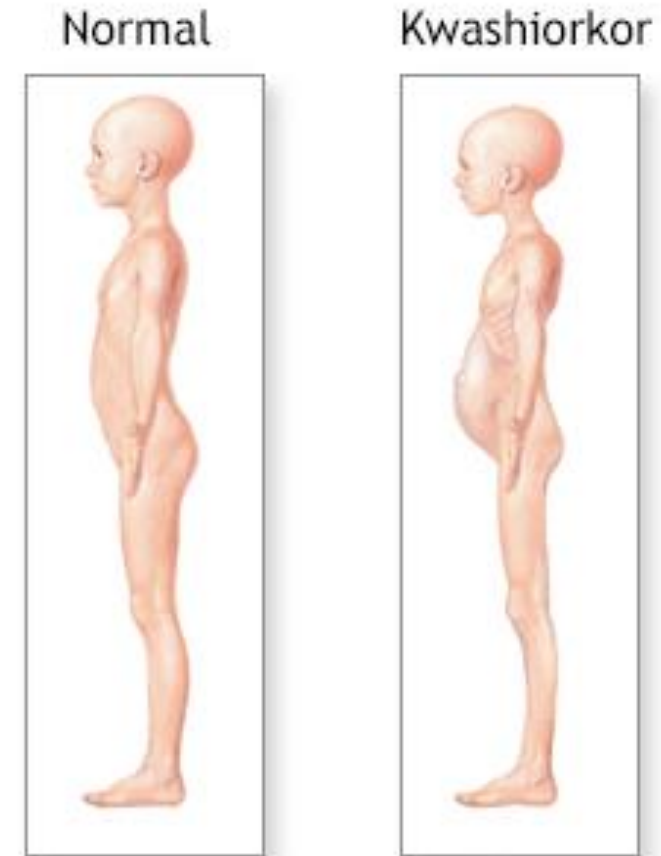
- 1. The children of about 1 year of age particularly when they **stop feeding mother milk**, should be **supplied with enough protein as per recommended daily allowances**.
- 2. Usually, **30-32 gm of protein** is recommended as the **daily allowance for year of age**.
- Daily protein requirement for a child of one year of **weighing 30 pounds is 24.6 g**.



Kwashiorkor

Remedy

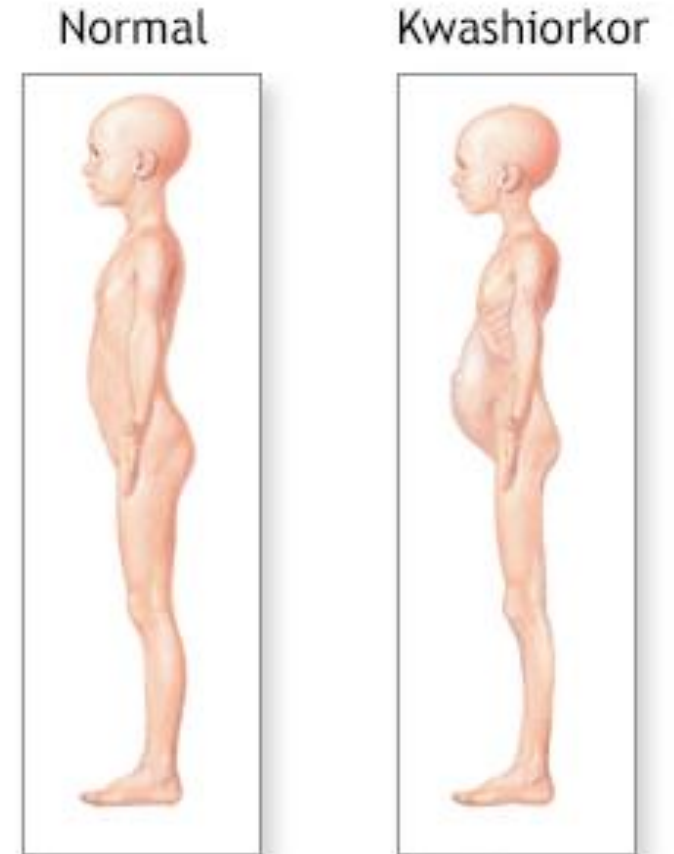
- 1. Must be given adequate amount of protein containing all the eight essential amino acids.
- It has been observed temporary absence of one essential amino acid can adversely affect synthesis.
- These essential amino acids are present in foods of animal origin like chicken, meat, eggs, marine fish and sea foods, milk and milk products such as cheese.
- It is found in a number of foods of vegetable origin such as peas, nuts, grains and beans.



Kwashiorkor

Remedy

- 2. The Protein supplements should be given along with food.
- A physician should be consulted for giving protein supplements to the child.



*Thank
You*

Symptoms of Anemia

Red = In severe
anemia

Eyes
- Yellowing

Skin
- Paleness
- Coldness
- Yellowing

Respiratory
- Shortness
of breath

Muscular
- Weakness

Intestinal
- Changed
stool color

Central
- Fatigue
- Dizziness
- **Fainting**

Blood vessels
- Low blood pressure

Heart
- Palpitations
- Rapid heart
rate
- **Chest pain**
- **Angina**
- **Heart attack**

Spleen
- Enlarge-
ment

