

Clinical assessment and sign of nutrient deficiency disorders

A. Protein energy malnutrition (PEM)

Introduction

According to World Health Organization, protein energy malnutrition (PEM) refers to “an imbalance between the supply of protein and energy and the body's demand for them to ensure optimal growth and function”. It is a major public health problem in India. It affects particularly the preschool children (<6 years) with its dire consequences ranging from physical to cognitive growth and susceptibility to infection. This affects the child at the most crucial period of time of development which can lead to permanent impairment in later life.

PEM is measured in terms of underweight (low weight for age), stunting (low height for age) and wasting (low weight for height). The prevalence of stunting among under five is 48% (moderate and severe) and wasting is 20% (moderate and severe) and with an underweight prevalence of 43% (moderate and severe), it is the highest in the world.

Classification

PEM can be classified into two types:

- Primary PEM
- Secondary PEM

(i) **Primary PEM**

This type of protein-energy malnutrition is found in children. It is rarely found in the elders, the main cause being depression. It can also be caused due to child or elder abuse. In children, PEM is primarily of two types:

- Kwashiorkor
- Marasmus

(ii) **Secondary PEM**

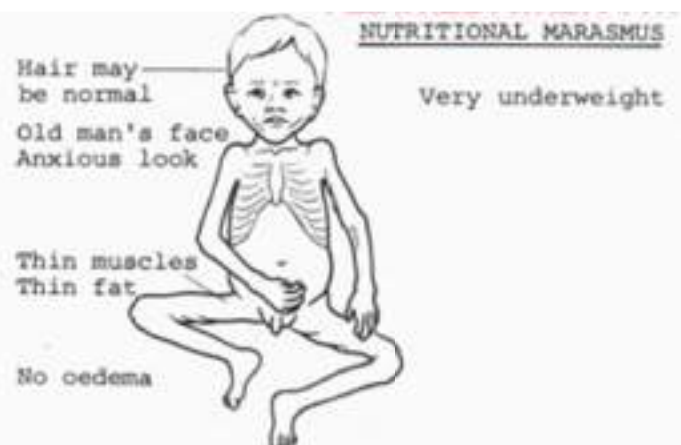
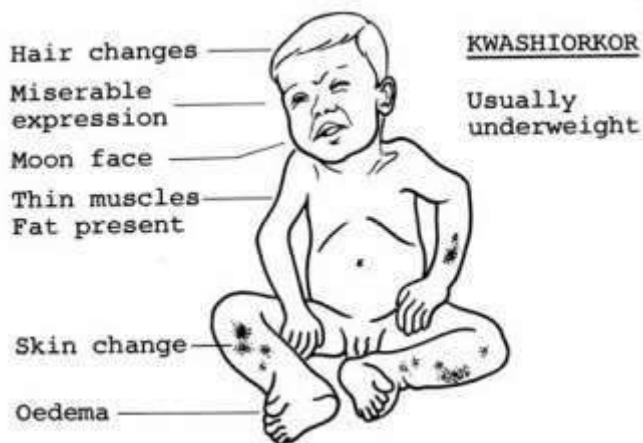
- It is caused due to disorders in the gastrointestinal tract.
- It can be caused due to infections, hyperthyroidism, trauma, burns, and other critical illnesses.
- It decreases appetite and impairs nutrient metabolism.

Sign and Symptoms

The symptoms of protein-energy malnutrition or PEM are as follows:

1. Apathy and irritability
2. The patient becomes weak and inefficient.
3. Impaired cognition and consciousness.
4. Temporary lactose deficiency
5. Diarrhoea
6. Gonadal tissues atrophy
7. Causes amenorrhoea in women
8. Causes libido in both men and women
9. Weight loss
10. Shrinking of muscles
11. Protrusion of bones
12. The skin gets thin, pale, dry, inelastic and cold
13. Hair fall
14. Impaired wound healing
15. Risk of hip fractures and ulcers increases in elderly patients
16. Heart size and cardiac output decreases in severe cases
17. A decrease in respiratory rate and vital capacity
18. Liver, kidney or heart failure
19. Acute PEM might also prove fatal

Population Group	Clinical Symptoms/Signs	
	Always Present	Sometimes Present
Children Marasmus Kwashiorkor	Wasting Oedema	Hunger, Wizen appearance <i>Mental change:</i> irritability, poor appetite <i>Skin change:</i> dermatitis <i>Hair:</i> sparse, loose, straight
Marasmic kwashiorkor	Wasting and oedema	Any of the above symptoms and signs
Adults	Wasting and weakness	Oedema, mental change



B. Anaemia

Introduction

Anemia is a condition in which you lack enough healthy red blood cells to carry adequate oxygen to your body's tissues. Having anemia, also referred to as low hemoglobin, can make you feel tired and weak.

There are many forms of anemia, each with its own cause. Anemia can be temporary or long term and can range from mild to severe. In most cases, anemia has more than one cause. See your doctor if you suspect that you have anemia. It can be a warning sign of serious illness.

Classification

- (i) Aplastic anemia
- (ii) Iron deficiency anemia
- (iii) Sickle cell anemia
- (iv) Thalassemia
- (v) Vitamin deficiency anemia

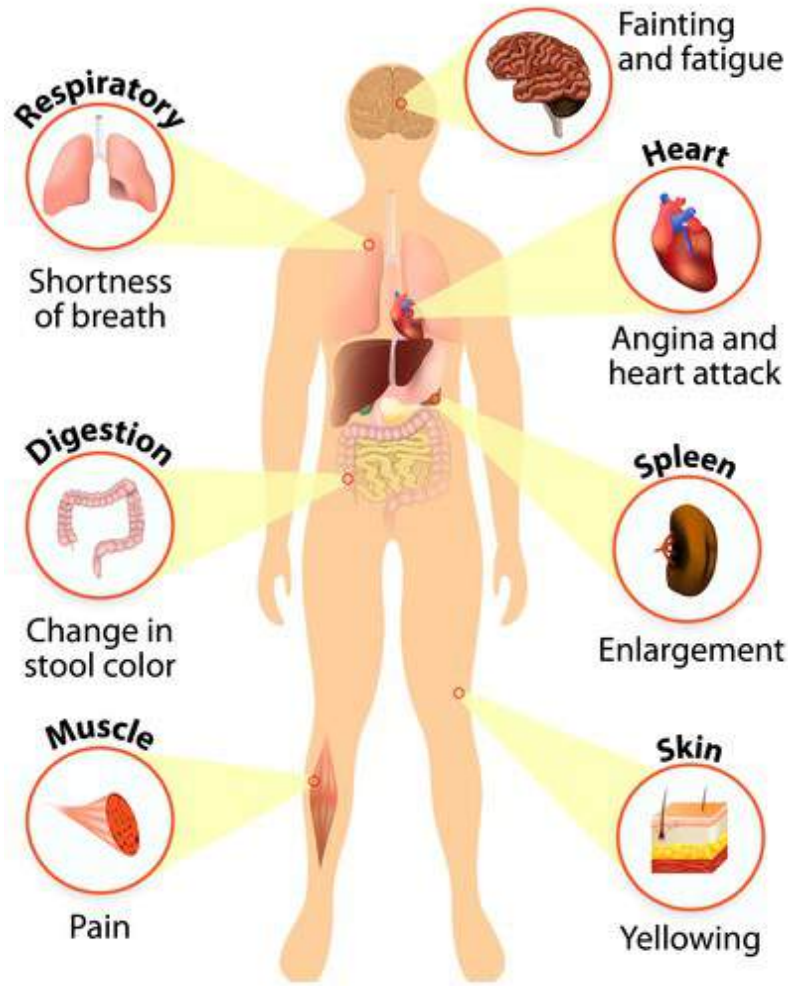
Sign and Symptoms

Signs and symptoms, if they do occur, might include:

1. Fatigue
2. Weakness
3. Pale or yellowish skin
4. Irregular heartbeats
5. Shortness of breath
6. Dizziness or lightheadedness
7. Chest pain
8. Cold hands and feet
9. Headaches

At first, anemia can be so mild that you don't notice it. But symptoms worsen as anemia worsens.

SYMPTOMS OF ANEMIA



Nutrition

C. Rickets

Introduction

Rickets is the softening and weakening of bones in children, usually because of an extreme and prolonged vitamin D deficiency. Rare inherited problems also can cause rickets.

Vitamin D helps your child's body absorb calcium and phosphorus from food. Not enough vitamin D makes it difficult to maintain proper calcium and phosphorus levels in bones, which can cause rickets.

Adding vitamin D or calcium to the diet generally corrects the bone problems associated with rickets. When rickets is due to another underlying medical problem, your child may need additional medications or other treatment. Some skeletal deformities caused by rickets may require corrective surgery.

Rare inherited disorders related to low levels of phosphorus, the other mineral component in bone, may require other medications.

Classification

This classification includes the most common etiologies of rickets:

- (i) Calciopenic rickets / Vitamin D related rickets
- (ii) Calcium Deficiency Rickets
- (iii) Phosphopenic rickets

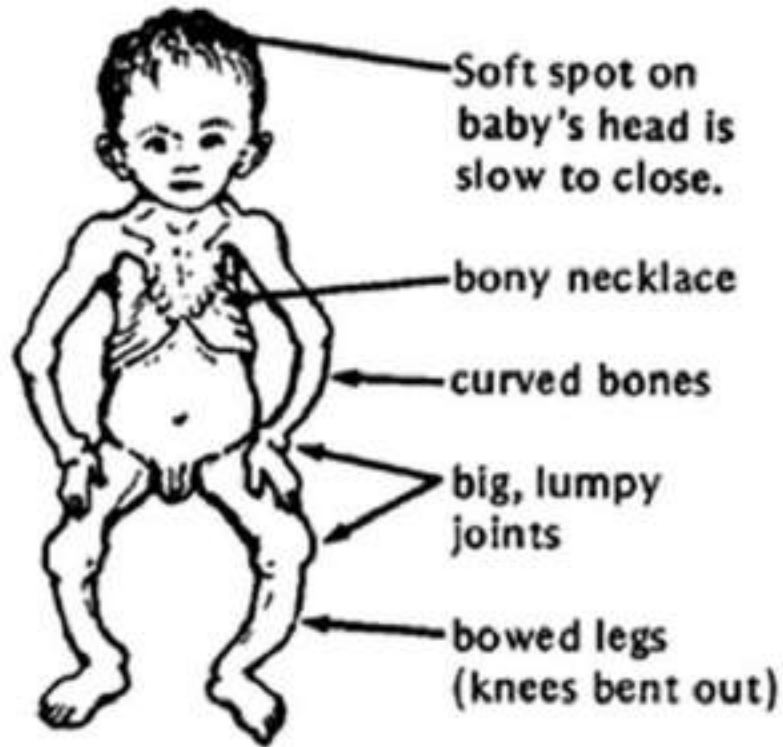
Sign and Symptoms

Symptoms of rickets include:

1. pain or tenderness in the bones of the arms, legs, pelvis, or spine
2. stunted growth and short stature
3. bone fractures
4. muscle cramps
5. teeth deformities, such as:
 - delayed tooth formation
 - holes in the enamel
 - abscesses
 - defects in the tooth structure
 - an increased number of cavities
6. skeletal deformities, including:
 - an oddly shaped skull
 - bowlegs, or legs that bow out
 - bumps in the ribcage

- a protruding breastbone
- a curved spine
- pelvic deformities

SIGNS OF RICKETS



Nutrition

D. Goiter

Introduction

Goiter is a condition where your thyroid gland grows larger. Your entire thyroid can grow larger or it can develop one or more small lumps called thyroid nodules.

Your thyroid gland is a small, butterfly-shaped endocrine gland located in your neck, below your Adam's apple. It produces the hormones thyroxine (also called T4) and triiodothyronine (also called T3). These hormones play a role in certain bodily functions, including:

- Metabolism.
- Body temperature.
- Mood and excitability.
- Pulse and heart rate.
- Digestion.

Goiter may be associated with an irregular amount of thyroid hormone in your body (hyperthyroidism or hypothyroidism) or with normal levels of thyroid hormone (euthyroid).

Classification

Classifications for goiter based on how it enlarges include:

- (i) **Simple (diffuse) goiter:** This type of goiter happens when your entire thyroid gland swells and feels smooth to the touch.
- (ii) **Nodular goiter:** This type of goiter happens when a solid or fluid-filled lump called a nodule develops within your thyroid and makes it feel lumpy.
- (iii) **Multinodular goiter:** This type of goiter happens when there are many lumps (nodules) within your thyroid. The nodules may be visible or only discovered through examination or scans.

Classifications of goiter based on thyroid hormone levels include:

- (i) **Toxic goiter:** This goiter happens when your thyroid is enlarged and produces too much thyroid hormone.
- (ii) **Nontoxic goiter:** If you have an enlarged thyroid but normal thyroid levels (euthyroid), it's a nontoxic goiter. In other words, you don't have hyperthyroidism (overactive thyroid) or hypothyroidism (underactive thyroid).

Sign and Symptoms

The main symptoms of goiter include:

1. A lump in the front of your neck, just below your Adam's apple.
2. A feeling of tightness in your throat area.
3. Hoarseness (scratchy voice).
4. Neck vein swelling.
5. Dizziness when you raise your arms above your head.
6. Difficulty breathing (shortness of breath).
7. Coughing.
8. Wheezing (due to squeezing of your windpipe).
9. Difficulty swallowing (due to squeezing of your esophagus).
10. Rapid heart rate (tachycardia).
11. Unexplained weight loss.
12. Diarrhea.
13. Sweating without exercise or increased room temperature.
14. Shaking.
15. Agitation.

Some people with goiter may also have hypothyroidism (underactive thyroid). Symptoms of hypothyroidism include:

1. Fatigue (feeling tired).
2. Constipation.
3. Dry skin.
4. Unexplained weight gain.
5. Abnormal menstruation (periods).

