



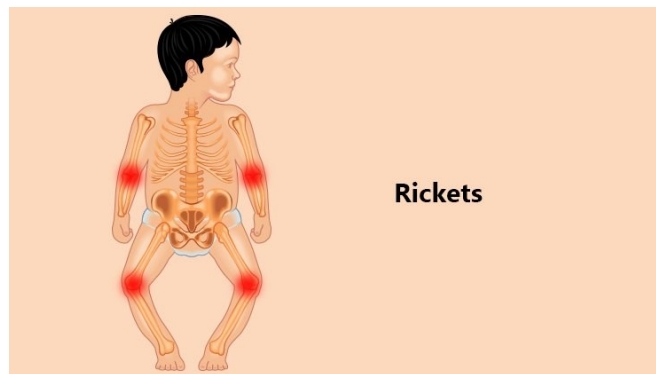
## VITAMIN DEFICIENCIES

- Vitamin D deficiency disorders:

1. Rickets in growing children
2. Osteomalacia in adults

1. Rickets: the primary defects include

- Interference with mineralisation of bone
- Deranged endochondral and intramembranous bone growth.



- ❖ Pathogenesis of lesions in rickets include :

- Proliferation of cartilage cells at the epiphyses followed by inadequate provisional mineralisation.
- Persistence and overgrowth of epiphyseal cartilage.
- Deformed bones due to lack of structural rigidity.

- ❖ Morphologic features:

- Rickets occurs in growing children from 6 months to 2 years of age.
- Craniobites: the earliest bony lesion which occurs in small round unossified areas in the membranous bones of skull. It disappears within 12 months of birth. The skull looks square and box like.
- Harrison's sulcus appears due to in drawing of soft ribs on inspiration.
- Rachitic rosary: is a deformity of chest due to cartilaginous overgrowth at costochondral junction.
- Pigeon chest deformity is the anterior protrusion of sternum due to action of respiratory muscles.
- Bow legs occur in ambulatory children due to weak bones of lower legs.
- Knocked knees may occur due to enlarged end of femur, tibia and fibula.

- ❖ Biochemical changes:



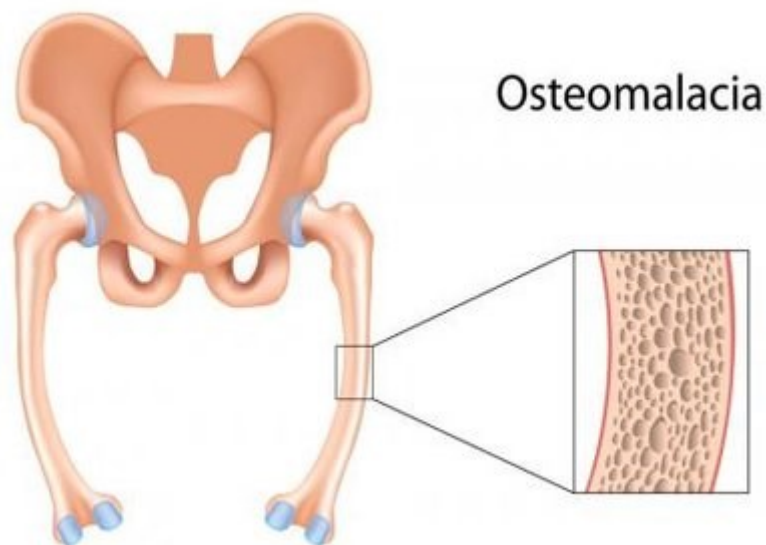
- Lowered levels of active metabolites of vitamin d.
- Plasma calcium levels are normal or slightly low.
- Plasma phosphate levels are lowered.
- Osteomalacia: it is seen in adults. Here there is failure o mineralisation of the osteoid matrix.

❖ Histological features:

- In H and E stained microscopic sections, there is widened and thickened osteoid seams (stained pink and decreased mineralisation at the borders between osteoid and bone (stained basophilic).
- In von kossa's stains, the wide seams of osteoid are unstained while the calcified bone is stained (black).

❖ Clinical features:

- Osteomalacia is characterised by
- Muscular weakness
- Vague bony pains
- Fracture following trivial trauma
- Incomplete or greenstick fractures
- Pseudo fractures t weak places in bones



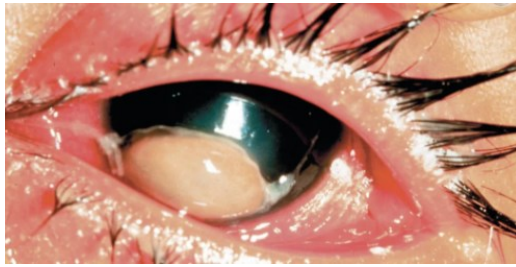
• Vitamin A deficiency disorders

- The following pathologic changes are seen due to vitamin A deficiency:
1. Ocular lesions: - lesions in the eyes are the most obvious.

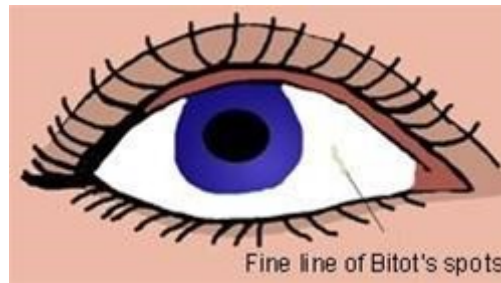


Night blindness is usually the first sign. As a result, there is –

- i. Xerophthalmia: Metaplasia of mucus secreting cells by squamous cells. So there is dry and scaly conjunctiva.



- ii. Keratomalacia: corneal ulcers which may or may not be infected.
- iii. Bitot's spots: focal triangular area of opacities, due to accumulation of keratinised epithelium.



- iv. If these occur on corneas, they prevent the transmission of light, ultimately leading to blindness.

2. Cutaneous lesions: the skin develops popular lesions giving toad-like appearance (xeroderma).

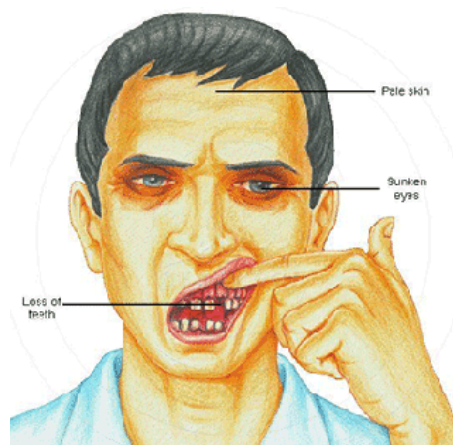


3. Other lesions include:
  - a) Squamous Metaplasia of respiratory epithelium of bronchus and trachea resulting in respiratory infections.
  - b) Squamous Metaplasia of pancreatic ductal epithelium which may lead to obstruction and cystic dilatation.



- c) Squamous Metaplasia of urothelium of the pelvis in kidney resulting in pyelonephritis and sometimes renal calculi.

- Vitamin C deficiency Disorders



- It leads to Scurvy whose lesions and clinical manifestation are seen in more commonly at 2 peak stages, in early childhood and very old age.
  - i. Haemorrhagic diathesis:
    - A marked tendency of bleeding is characteristic of scurvy.
    - Haemorrhages are seen in the skin, mucous membranes, gums, muscles, joints and underneath the periosteum.
  - ii. Skeletal lesions:
    - The most prominent changes are the deranged formation of osteoid matrix and not deranged mineralisation.
    - Mineralised cartilage under the widened and irregular epiphyseal plates project as scorbutic rosary.
  - iii. Delayed wound healing:

It occurs due to

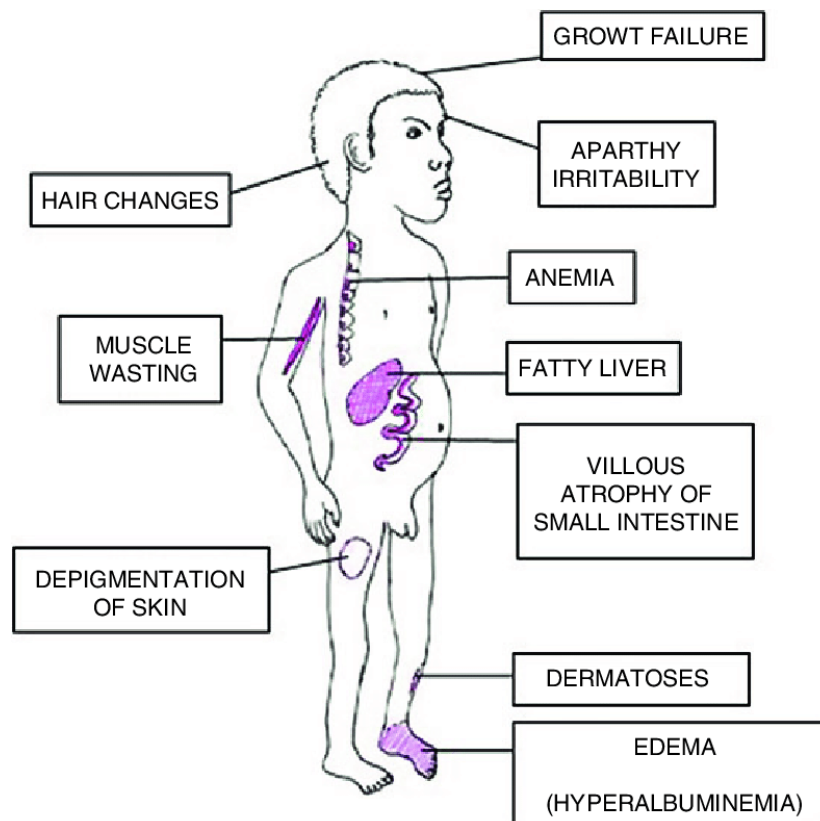
    - Deranged collagen synthesis
    - Poor preservation and maturation of fibroblasts
    - Localisation of infections in the wound
  - iv. Anaemia:
    - It is generally normocytic normochromic type; occasionally it may be megaloblastic or even iron deficiency type.

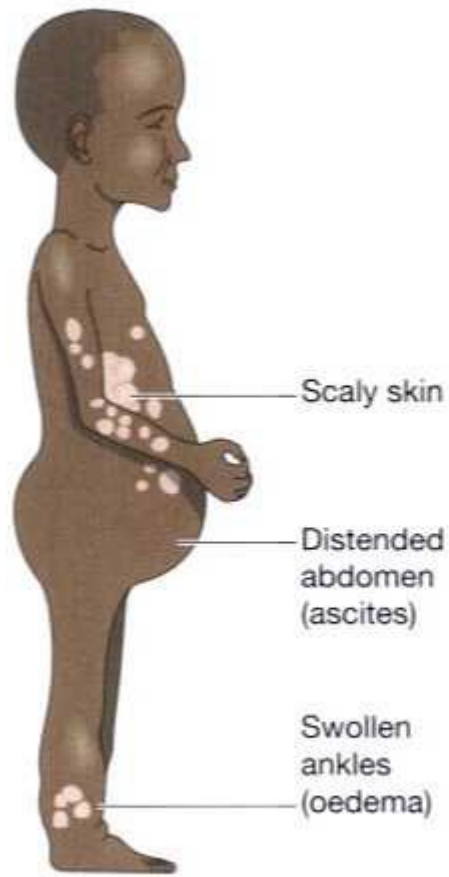


- It may be as a result of haemorrhage or deranged iron metabolism.
- v. Lesions in tooth and gums: scurvy interferes with development of dentin. The gums are soft and swollen, because of when they bleed and get infected often.
- vi. Skin rash: hyperkeratotic and follicular rash may occur in scurvy.

• Difference between Kwashiorkor and Marasmus

Feature	Kwashiorkor	Marasmus
Definition	Protein deficiency with sufficient calorie intake	Starvation in intake with overall lack of calories
Clinical features	Occurs in children between 3 months and 3 years of age	Common in infants under 1 year of age
	Wasting of muscles but presented adipose tissue	Wasting of all tissue including muscles and adipose tissue
	Oedema, localised or generalised	Oedema absent
	Enlarged fatty liver	No hepatic enlargement





**A Kwashiorkor**



**B Marasmus**