Rickets

Definitions

- Rickets-Deficient mineralization at the growth plate
- Osteomalacia-Impaired mineralization of the bone matrix
- Rickets and osteomalacia usually occur together as long as the growth plates are open;only osteomalacia occurs after the growth plates have fused.

Types of rickets

- Calcipaenic rickets
- Phosphopaenic rickets

Calcipaenic rickets

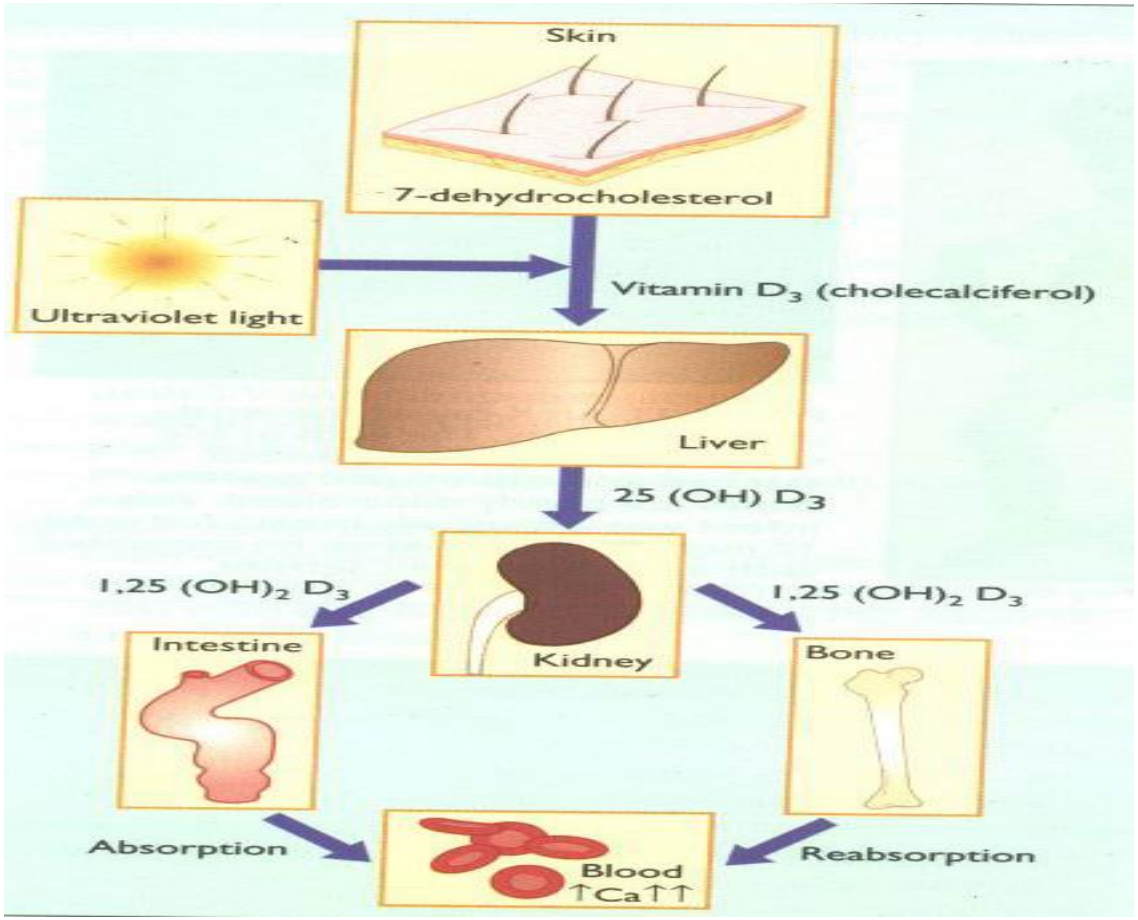
(Inadequate vitamin D, defective utilization of vitamin D or inadequate calcium)

1. Nutritional vitamin D deficiency
2. Distal renal tubular acidosis
3. Vitamin D resistant rickets
4. Calcium deficiency
5. Secondary Vitamin D deficiency (Malabsorption, antiepileptic drug therapy, CRF, CLF)
6. 25 hydroxylase deficiency in liver (rare)

Phosphopenic rickets

1. Prematurity/ Total parenteral nutrition
2. Hereditary hypophosphataemic rickets: (XLH, AD, AR, HHRH)
3. Proximarenal tubular acidosis

Vitamin D metabolism



Clinical presentation

- Infancy

  irritability,sweating,seizures,jitteriness, cardiomyopathy,delayed milestones,delayed dentition,craniotabes,delayed closure of anterior frontanelle and bossing of the skull.

- Older child

  waddling gate,Harrison sulcus,rachiti rosary,genu valgum,genu varum or windswept deformity

- Adolescent child

Seizures and bone pain

Sources of vitamin D

- Sunlight is the most important source
- Fish liver oil, fatty fish, egg yolk
- Fortified milk formula and margarine

- **Poor sources**

  breast milk & cow's milk

  cereals, vegetables and fruits

Bone physiology

- Bone consists of
  - Matrix - osteoid - protein
  - Mineral - calcium and phosphate

Continuous remodelling

Osteoblasts- laying down

Osteoclasts- resorption

Bone physiology cont…

- Bone mineralisation needs optimum levels of calcium and phosphate in the bone
- Calcium and phosphate homeostasis is maintained by
  - Calcitriol(1,25 DHCC)
  - PTH

Diagnosis of rickets

- Clinicaly
- Biochemicaly
- radiologicaly

Investigations

- Biochemical investigations
  Calcium, ALP, phosphate
- Radiological investigations
  X- rays of wrist and knee

Special investigations

LFT, RFT

PTH

Plasma 25OHD and 1,25(OH)2D3

Urine calcium, phosphate, creatinine

Tubular reabsorption of phosphate (TRP)

Tubular maximum for phosphate reabsorption (TmPO4/GFR)

Calcipaenic vs phosphopaenic rickets

Alkaline phosphatase levels are usually high in calcipaenic rickets whereas they are marginally elevated in phosphopaenic rickets

PTH is the most important biochemical investigation which is elevated in calcipaenic rickets but usually normal in phosphopricketsaenic

Management principles

1. Vitamin D and calcium are used to treat Vitamin D deficiency/ Calcipaenic rickets
2. After 1-2 months Rx a repeat x-ray should be done to look for the line of healing
3. Serum ALP should show a downward trend at the end of 1 month
4. If biochemical & radiological evidence of response is present, nutritional rickets could be diagnosed and treatment continued for 2-3 months
5. If suboptimal response, VDDR 1&2 are likely and PTH& 25-OH Vitamin D levels should be evaluated if not done early

Nutritional rickets MX

1. **Balanced diet**
2. **Exposure to sunlight**
3. **Correct predisposing factors**
3. **Vitamin D supplements**

THANK YOU