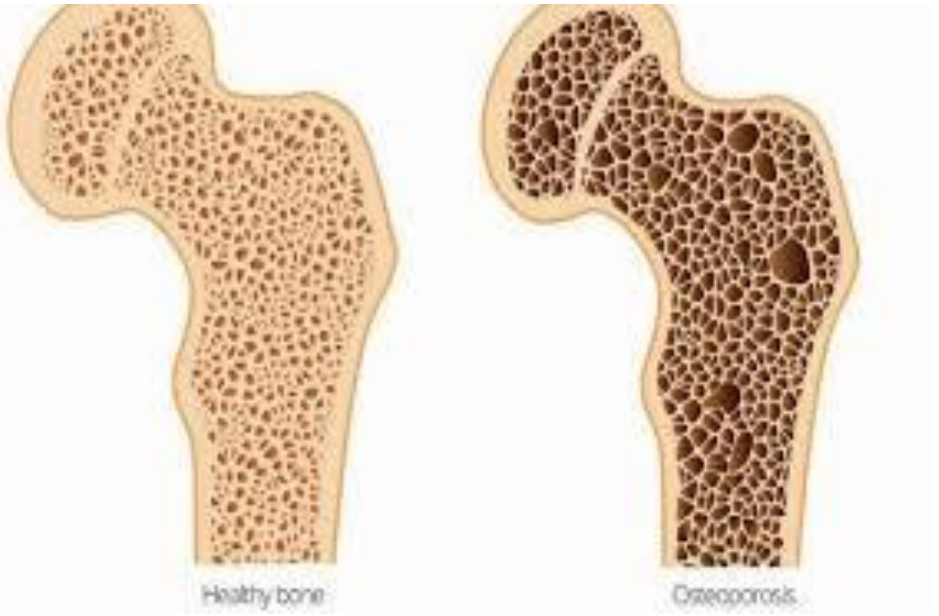


Public Health Aspects Of Disabilities Limitations: (Osteoporosis, Osteomalacia And Rickets)

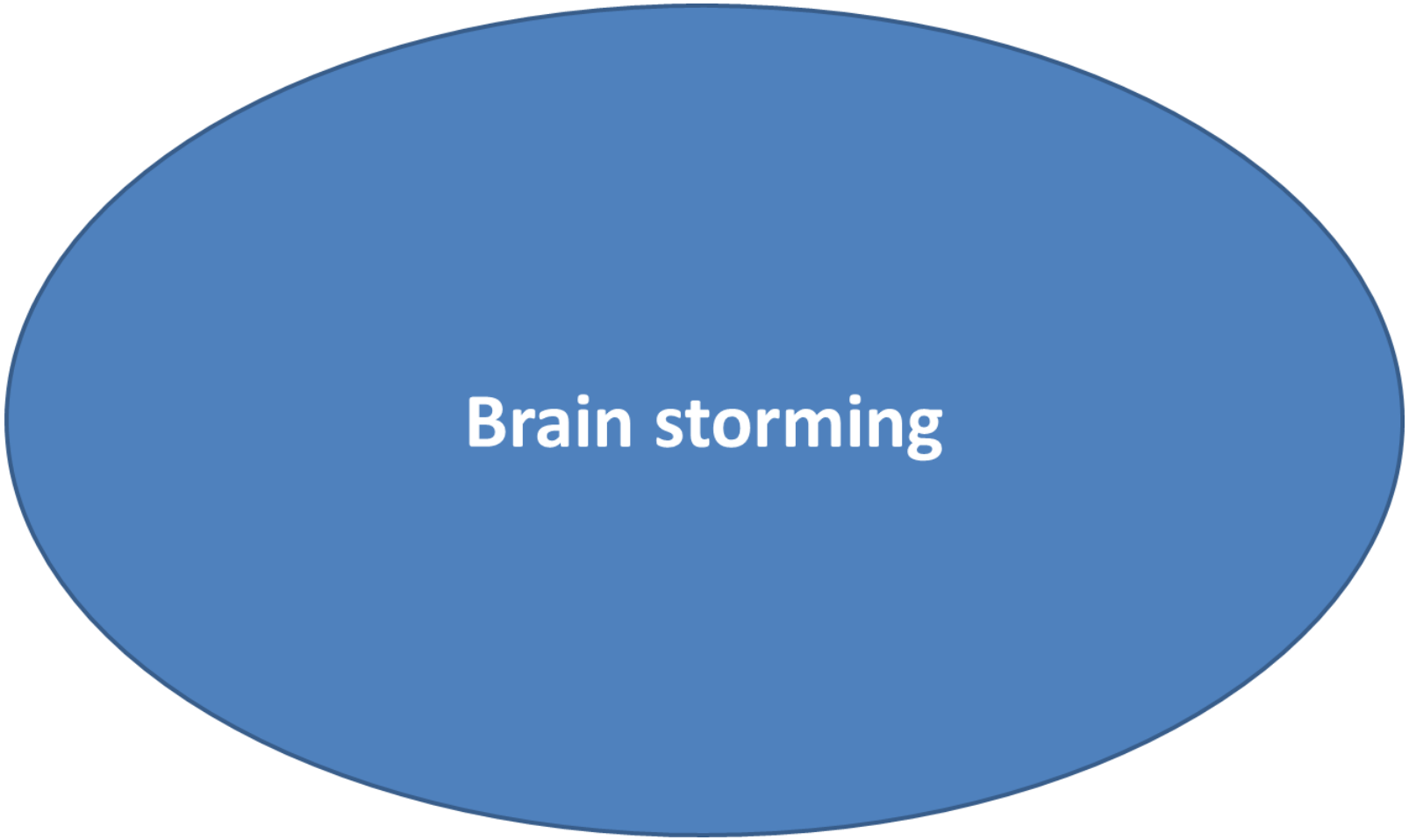
Dr Salma

C Med

Learning Outcomes

At the end of this lecture the student will be able to:

- Explain the types of rehabilitation and public health issue faced by the disabled person and measure to be taken for rehabilitation.
- Discuss epidemiology and prevention of osteoporosis ,osteomalasis and rickets.


Brain storming

Rehabilitation

- “a set of interventions designed to optimize functioning and reduce disability in individuals with health conditions in interaction with their environment”.
- rehabilitation helps a child, adult or older person to be as independent as possible in everyday activities and enables participation in education, work, recreation and meaningful life roles such as taking care of family

- Globally, an estimated 2.4 billion people are currently living with a health condition that benefits from rehabilitation.
- The need for rehabilitation worldwide is predicted to increase due to changes in the health and characteristics of the population. For example, people are living longer, but with more chronic disease and disability.
- In some low- and middle-income countries, more than 50% of people do not receive the rehabilitation services they require. (WHO 2021)

Types Of Rehabilitation

The three main types of rehabilitation therapy are

- Occupational,
- Physical and
- Speech.

Each form of rehabilitation serves a unique purpose in helping a person reach full recovery, but all share the ultimate goal of helping the patient return to a healthy and active lifestyle.

Occupational Therapy

- Occupational therapists provide occupational therapy (OT) treatments to help individuals who require specialized assistance to participate in everyday activities, or “occupations.” Occupations don’t just refer to work or your job, but can also refer to self-care practices
- Occupational therapists help by making changes to things that hinder someone's ability to complete tasks such as eating, dressing, brushing one’s teeth, completing school activities and working.

- Modifications may include changing the way the task is approached, changing the environment in which the task is completed or
- helping a person develop skills necessary to complete certain tasks. , everyday tasks and recreational activities.

Physical Therapy

- Physical therapists provide treatment for those who are experiencing pain or difficulty in functioning, moving or living life normally.
- Physical therapy is commonly used to relieve pain, improvement movement, provide rehabilitation after a stroke, injury or surgery, assist in recovery after giving birth, assist in the recovery of sports-related injuries, teach individuals how to use devices such as walkers and canes, manage chronic illnesses like heart disease or arthritis, and more

Speech Therapy

- Speech therapists (or speech-language pathologists) provide treatment for those who have speech issues.
- Children with speech issues such as stammering can benefit from communication exercises under the instruction of a therapist.
- Adults with learning difficulties or who have another condition, such as stroke, neck or head cancer, Parkinson’s disease or dementia, can also benefit from the help of a speech therapist.

Public Health Issue Faced By The Disabled Person

Attitudinal barriers

- People with disability commonly report experiences of discrimination by health service providers and other staff at health facilities.
- Negative attitudes.

Physical barriers

- Health services and activities are often located far away from where most people live or in an area not serviced by accessible transport options.

- Stairs at the entrance to buildings or services and activities located on floors which do not have elevator access
- Inaccessible toilets, passages, doorways and rooms that do not accommodate wheelchair users, or are difficult for people with mobility impairments, are common.

Communication barriers

- A key barrier to health services for people who have a hearing impairment is the limited availability of written material or sign language interpreters at health services.

Financial barriers

- Over half of all people with disability in low-income countries cannot afford proper health care.

- Many people with disability also report being unable to afford the costs associated with travelling to a health service and paying for medicine
- Other problem are
- Lack of education. ...
- Trapped in Poverty.
- Sexual abuse
- Feeling of being ignored and depression

Measure To Be Taken For Rehabilitation.

- Exercises to improve a person's speech, language and communication after a brain injury.
- Modifying an older person's home environment to improve their safety and independence at home and to reduce their risk of falls.
- Exercise training and education on healthy living for a person with a heart disease.
- Making, fitting and educating an individual to use a prosthesis after a leg amputation.
- Positioning and splinting techniques to assist with skin healing, reduce swelling, and to regain movement after burn surgery.

- Prescribing medicine to reduce muscle stiffness for a child with cerebral palsy.
- Psychological support for a person with depression.
- Training in the use of a white cane, for a person with vision loss.

- The rehabilitation workforce is made up of different health workers, including but not limited to physiotherapists,
- occupational therapists, speech and language therapists and audiologists,
- orthotists and prosthetists, clinical psychologists, physical medicine and rehabilitation doctors, and rehabilitation nurses.

But also support by family and society

Metabolic Bone Diseases

- Rickets
- Osteomalacia
- Osteoporosis

Rickets:

Disease of growing bone of children (in it epiphyseal plates) are not closed in which **defective mineralization** occur in both bone and cartilage of epiphyseal growth plate.

Osteomalacia:

Disorder of mature bones in adult(after epiphyseal plate closure) in which **mineralization** of new osteoid bone is inadequate or delayed.

Osteoporosis :is a bone disease that occurs when the body loses too much bone, makes too little bone, or both. As a result, bones become weak and may break from a fall or, in serious cases, from sneezing or minor bumps

Causes of Rickets and Osteomalacia

- The most common cause of rickets and osteomalacia is vitamin D deficiency (not enough vitamin D). Usually, this is due to:
- A diet without enough vitamin D.
- Insufficient vitamin D production in your skin (from having darker colored skin or keeping skin covered without sufficient sun exposure, or living in northern regions of the country). This is particularly a problem during the winter months.
- Some medical conditions, such as celiac disease, can affect gut absorbs vitamin D from food. Kidney or liver disorders. ..
- In a few cases, rickets is the result of rare genetic conditions that affect how the body uses vitamin D or phosphate.

Risk for Developing Rickets

Age

- Rickets is most common in children who are between 6 and 36 months old. During this time period, children usually experience rapid growth. This is when their bodies need the most calcium and phosphate to strengthen and develop their bones.

Diet

- if you eat a vegetarian diet that doesn’t include fish, eggs, or milk. if you have trouble digesting milk or have an allergy to milk sugar (lactose).
- Infants who are only fed breast milk can become deficient in vitamin D as well. Breast milk doesn’t contain enough vitamin D to prevent rickets.

Skin color

- Children of African, Pacific Islander, and Middle Eastern descent are at the highest risk for rickets because they have dark skin. Dark skin doesn’t react as strongly to sunlight as lighter skin , so it produces less vitamin D.

Geographic location

- Our bodies produce more vitamin D when they’re exposed to sunshine, so you’re more at risk for rickets if you live in an area with little sunlight. You’re also at a higher risk if you work indoors during daylight hours

Symptoms of Rickets and Osteomalacia

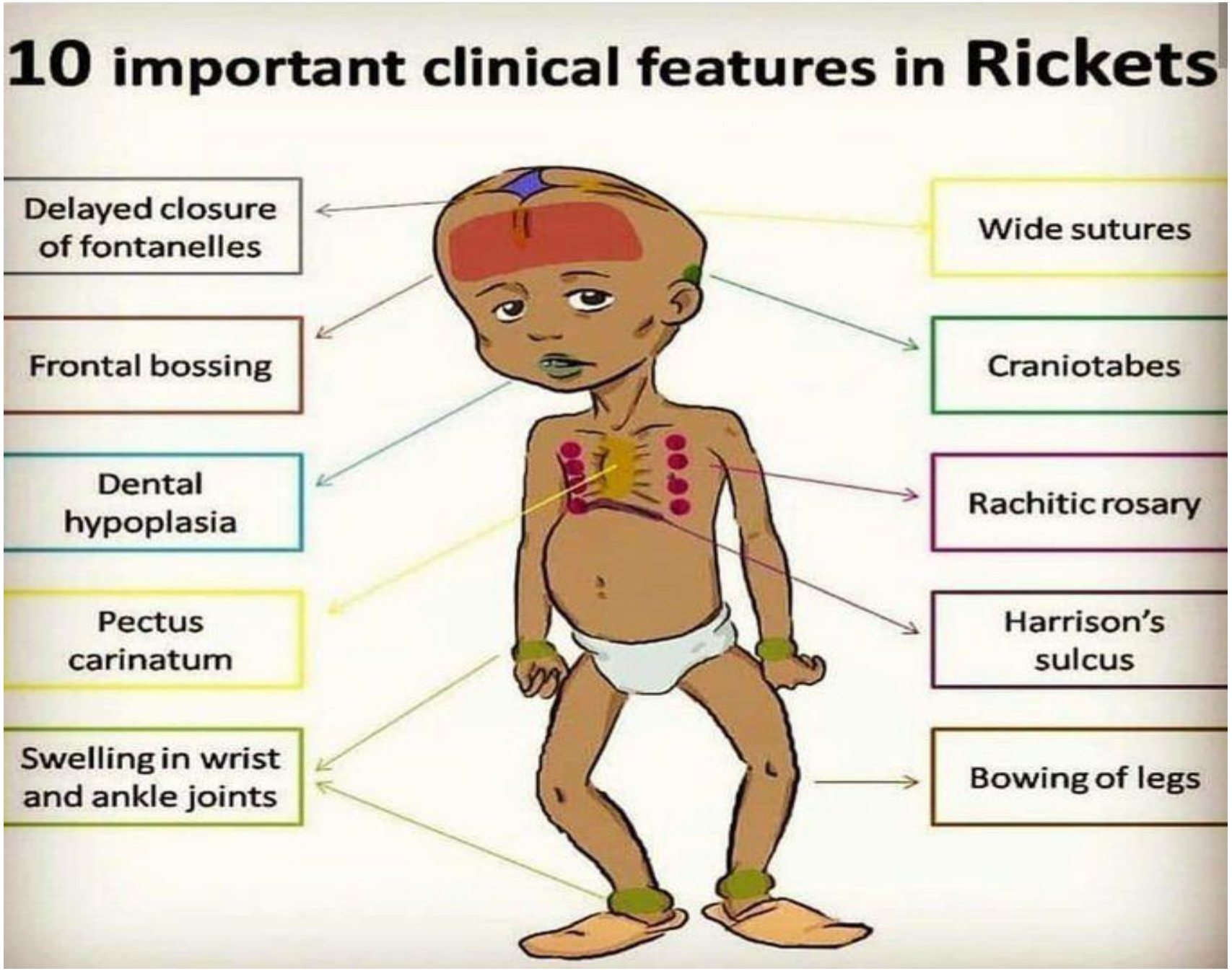
- Children with rickets have bone pain, poor growth and soft, weak bones that can lead to bone deformities like bowing of the legs which worsens over time, wider wrists, and frontal bossing (an unusually prominent forehead).
- Osteomalacia causes bone pain and can increase the risk of fracture.

Symptoms of rickets include:

- pain or tenderness in the bones of the arms, legs, pelvis, or spine
- stunted growth and short stature
- bone fractures
- muscle cramps,frontal bossing

- **teeth deformities**, such as: delayed tooth formation,holes in the enamel, defects in the tooth structure,an increased number of cavities
- **skeletal deformities**, an abnormally shaped skull
- bowlegs, or legs that bow out,Pigeon shape chest, ricketic rosary,a curved spine
- pelvic deformities

10 important clinical features in Rickets



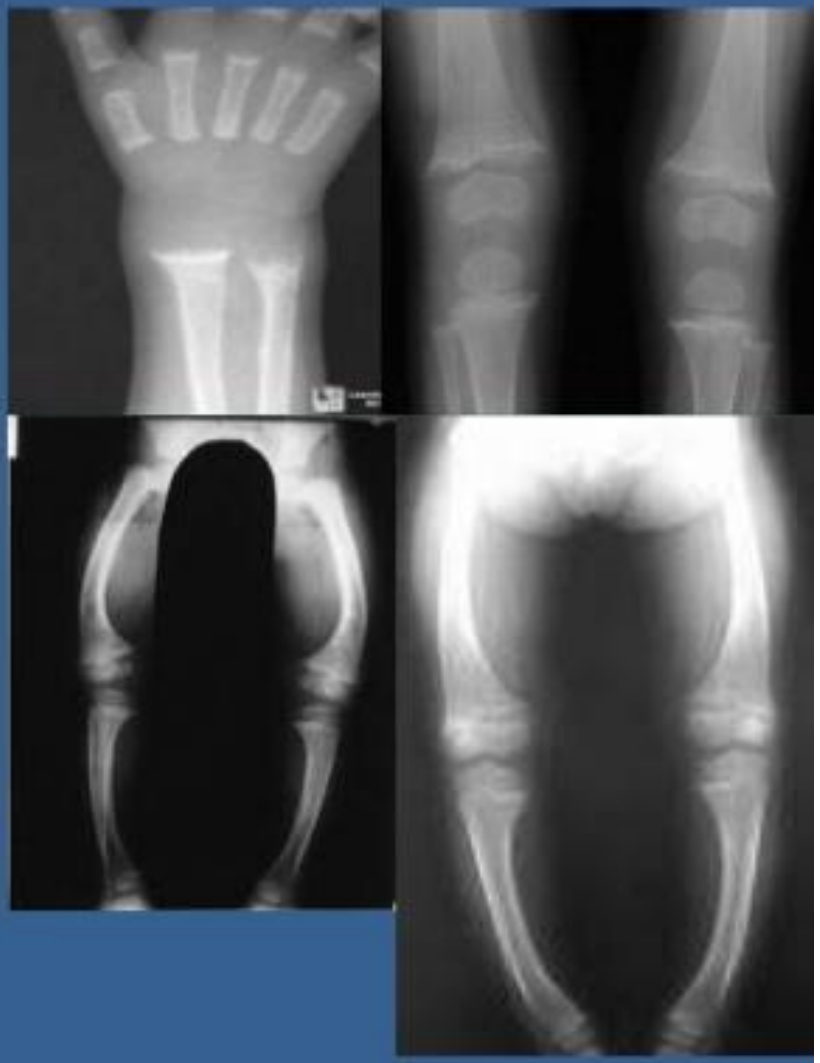
Radiographic Features in Rickets

- In the growing skeleton, the deficiency of normal mineralization is most evident at metaphyseal zones of provisional calcification where there is an excess of non-mineralized osteoid resulting in growth plate widening and abnormal configuration of the metaphysis:

- fraying: indistinct margins of the metaphysis
- splaying: widening of metaphyseal ends
- cupping: concavity of metaphysis

X-rays: In rickets,

- Delayed appearance of epiphyses.
- Thickening & widening of growth plate.
- Cupping and splaying of metaphysis.
- Rarefaction & bowing of diaphysis.
- Bone deformities – Genu varum, genu vulgum, coxavera.



Biochemical Findings In Rickets

- Deficiency of vitamin D is usually more common
- Serum calcium may show low levels of calcium, serum phosphorus may be low,
- Bone specific alkaline phosphatase isoenzyme is elevated as a result of increased osteoblastic activity.

Symptoms of Osteomalacia

- pain felt in the bones and joints
- muscle pain and weakness, particularly following exercise
- bones that break more easily, particularly those in the hips, lower back and feet
- difficulty walking
- muscle cramps
- pins and needles in the hands and feet because of low calcium levels

Radiographic Features in Osteomalacia

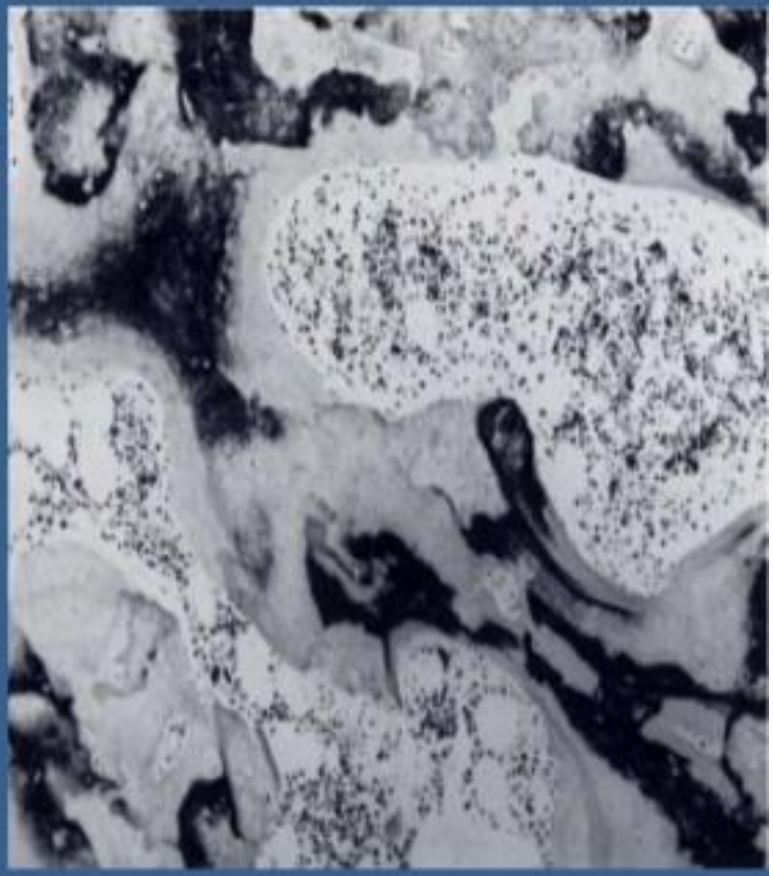
- Looser zones or pseudofractures,
- the classic radiographic findings of osteomalacia are radiolucent bands perpendicular to the cortex that incompletely span the diameter of the bone.
- Mild to moderate sclerosis may be seen at the margins of these pseudofractures

Biochemical Level In Osteomalacia

- Biochemical features are similar to those of rickets. The major factor is an abnormally low vitamin D concentration in blood serum.
- Major typical biochemical findings include: Low serum and urinary calcium and low level of phosphorous
- Increased serum alkaline phosphatase or bone specific alkaline phosphatase activity is classically associated with osteomalacia due to vitamin D deficiency but is not an early or reliable clue because some patients may have normal or only borderline elevated levels.

Bone biopsy:

- Osteoid seams are wider and extensive.
- Defective mineralization



Worldwide prevalence of rickets.

Country	Year	Percentage
Asia, Middle East, and Africa		
Mongolia	1998	70
Tibet	1994	66
Ethiopia	1997	42
Yemen	1987	27
Turkey	1994	10
Nigeria	1998	9
Europe		
The Netherlands – macrobiotics	1990	55
UK – Manchester, minorities*	2002	1.6

Epidemiology of Rickets

The peak incidence of rickets occurs among infants and young children aged 6–23 months and adolescents aged 12–15 years, though it may also occur in children aged between 2 years and 11 years (6–9).

In developed countries, rickets is a rare disease (incidence of less than 1 in 200,000). Recently, cases of rickets have been reported among children who are not fed enough vitamin D.

Rickets in Pakistan

- Despite extensive search exact prevalence of rickets in Pakistan could not be found ,though in South East Asia its prevalence is about 15-18%.

Prevalence of Osteomalacia

- The incidence of osteomalacia is approximately 1 in 1000 people in World.
- The prevalence of osteomalacia is 3.6% (3600/100,000) in Pakiatan.

Prevention and treatment

Vitamin D Daily Requirements by NIH

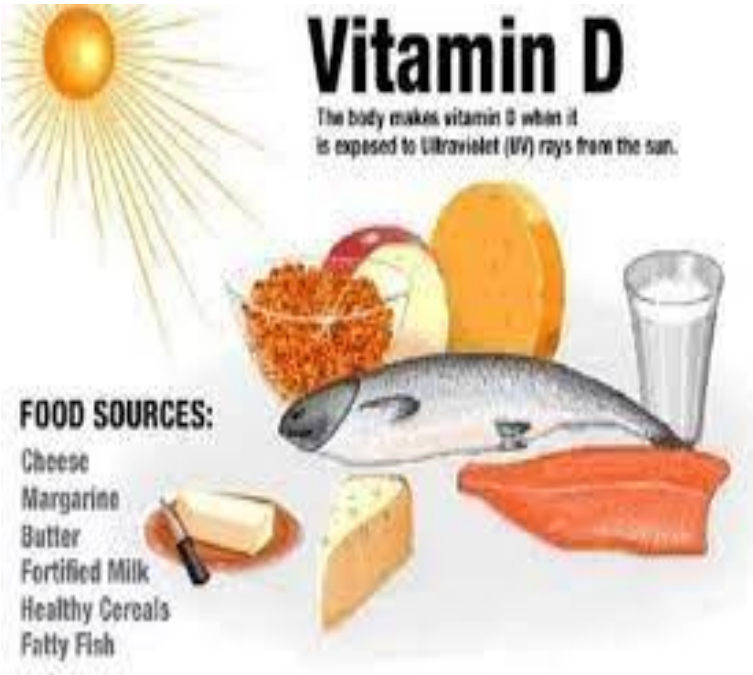
Life Stage	Recommended Amount
Birth to 12 months	10 mcg (400 IU)
Children 1–13 years	15 mcg (600 IU)
Teens 14–18 years	15 mcg (600 IU)
Adults 19–70 years	15 mcg (600 IU)
Adults 71 years and older	20 mcg (800 IU)
Pregnant and breastfeeding	15 mcg (600 IU)

Treatment Of Rickets

- For the treatment of vitamin D deficiency rickets, the American Academy of Pediatrics recommends an initial 2- to 3-month regimen of “high-dose” vitamin D therapy of 1000 units daily in neonates,
- 1000 to 5000 units daily in infants 1 to 12 months old, and
- 5000 units daily in patients over 12 months old.

Source of Vit D

- Spend time in sunlight. Vitamin D is often referred to as “the sunshine vitamin” because the sun is one of the best sources of this nutrient.
- Consume fatty fish and seafood.
- Eat more mushrooms.
- Include egg yolks in your diet.
- Eat fortified foods.
- Take a supplement.
- Try a UV lamp.



Calcium Daily Requirements

- The recommended daily intake (RDI) of calcium is 1,000 mg per day for most adults, though women over 50 and everyone over 70 should get 1,200 mg per day.

Daily Calcium Requirement NIH

Age	male	female	Pregnant	Lactating
0–6 months	200 mg	200mg		
7–12 months	260 mg	260 mg		
1–3 years	700 mg	700mg		
4–8 years	1,000 mg	1000mg		
9–13 years	1,300 mg	1300mg		
14–18 years	1,300 mg	1300mg	1,300 mg	1,300 mg
19–50 years	1,000 mg	1000m	1,000 mg	1,000 mg
51–70 years	1,000 mg	1200mg		
71+ years	1,200 mg	1200mg		

Source of Calcium

- milk, cheese and other dairy foods.
- green leafy vegetables – such as curly kale, okra and spinach.
- soya drinks with added calcium.
- bread and anything made with fortified flour.
- fish where you eat the bones –
- calcium-fortified beverages such as almond and soy milk.
- dried peas and beans,

Prevention of Rickets and Osteomalacia

- The best way to prevent is to eat a diet that includes adequate amounts of calcium, phosphorous, and vitamin D
- Food fortified with vit D
- Following a regular activity for exposure to early morning sun rays
- Monitoring of calcium and vitamin-D regularly
- Taking vitamin-D and calcium supplements regularly
- Regular weight bearing exercise
- Early diagnosis and management of the disease symptoms are essential to avoid the occurrence of permanent deformities in the bones.

Osteoporosis

Osteoporosis is a bone disease which characterized by low bone mass as result of body loses too much bone and makes too little bone. This leads to increased bone fragility so increased susceptibility to fracture, especially in the hip, spine, wrist and shoulder. Osteoporosis means “porous bone.” Healthy bone looks like a honeycomb. Once osteoporosis happens, the holes and spaces in the honeycomb are much larger than in healthy bone. Though bones in osteoporosis have lost density, weaken and are more expected to break

Osteoporosis

- Currently, it has been estimated that more than 200 million people are suffering from osteoporosis. According to recent statistics from the International Osteoporosis Foundation, worldwide, 1 in 3 women over the age of 50 years and 1 in 5 men will experience osteoporotic fractures in their lifetime.

European Journal of Rheumatology 2017

Osteoporosis in Pakistan

- It is estimated that about 9.9 million people in Pakistan have osteoporosis of whom 7.2 million are women.

Journal Of Pakistan Medical Association 2017

Difference between Osteoporosis and Osteomalacia

Differences	Osteomalacia	Osteoporosis
Definition	Demineralization of the bones	Reduction of the bone mineral density
Presence	Adults	≥ 65 years women
signs and symptoms	Weakness of the muscles and fragile bones	Curving of the back and risk for fractures
Causes	Deficiency in Vitamin D	Deficiency in calcium and phosphorous, drugs, inherited, endocrine disorders, alcohol drinking.
Treatment	Injections of Vitamin D	Healthy lifestyle, calcium supplements and naturally calcium-diet, harmones

Osteoporosis

Causes

- The chief cause of osteoporosis is a deficiency of certain hormones, as androgen in men and estrogen in women.
- Risk factors for osteoporosis include absence of exercise, deficiency of calcium and vitamin D, malabsorption, high-dose oral corticosteroids, low body mass, smoking, alcohol intake, rheumatoid arthritis, and family history of osteoporosis

Osteoporosis

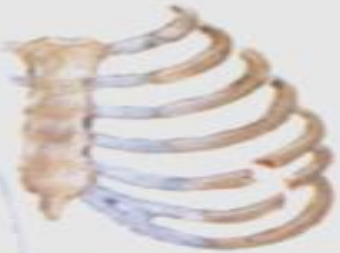
Symptoms & Signs

- Bony aches
- Easy fractures

  spine - lower radius - femoral neck
- Rib fracture , chest pain

Clinical Manifestations of Osteoporosis

Axial



Rib fractures common

Vertebral compression fractures cause continuous (acute) or intermittent (chronic) back pain from midthoracic to midlumbar region, occasionally to lower lumbar region

Appendicular

Fractures caused by minimal trauma

Proximal femur (intertrochanteric or intracapsular)

Proximal humerus

Distal radius

Most common types

Progressive thoracic kyphosis, or dowager's hump, with loss of height and abdominal protrusion

Osteoporosis Diagnosis

X-rays

- Decrease bone density
- Wedging or biconcave vertebrae
- Thin cortex and deformities

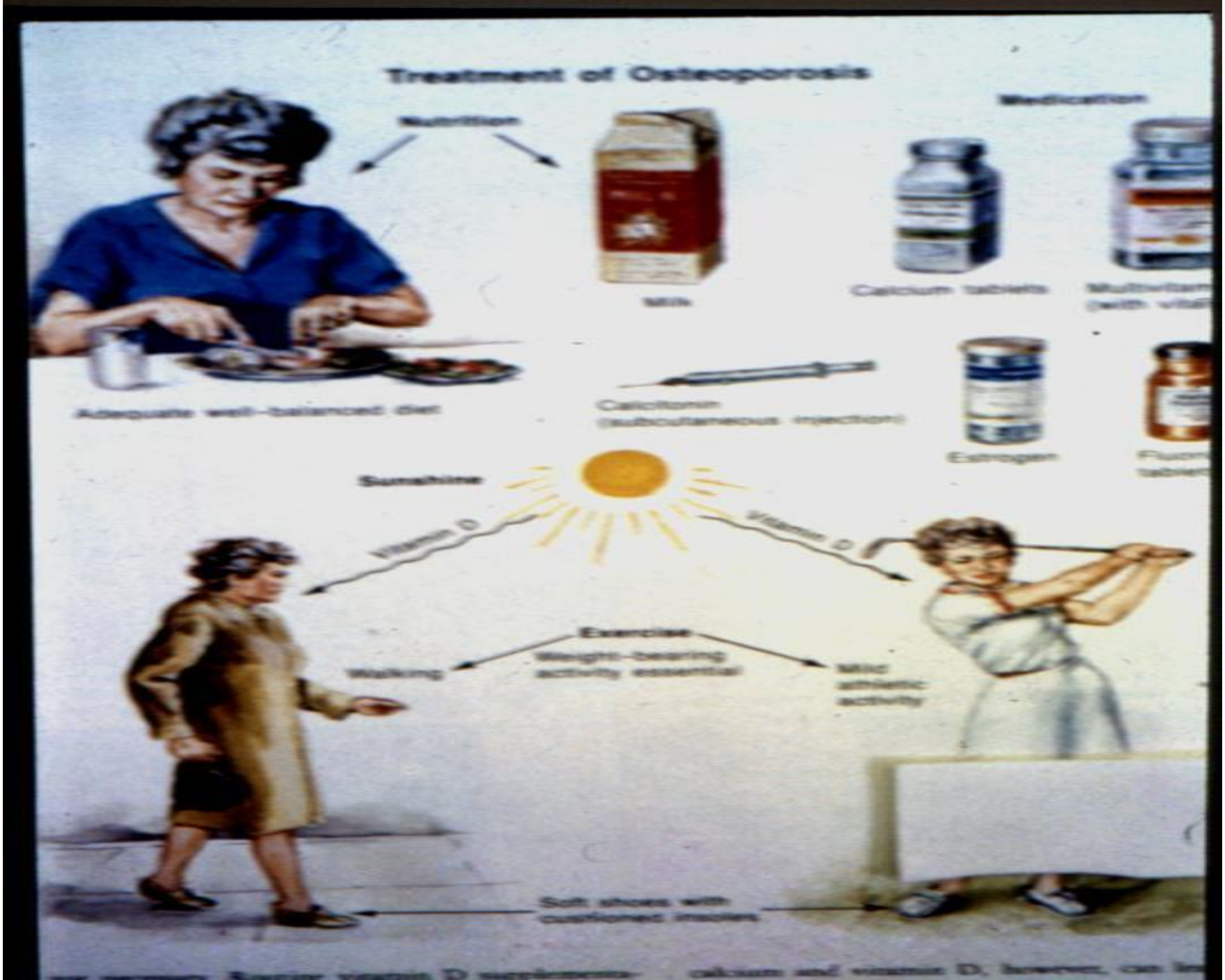
Dexa Scan

Biopsy

Osteoporosis

Prevention

* Good diet (Green leafy vegetables, juices and cereals are good source)
* Exercise
* Exposure to sun light
- Lifestyle changes, including take off smoking, excessive alcohol intake, take sufficient calcium and vitamin D
* Hormone therapy


Treatment of Osteoporosis
Nutrition
Medication
Milk
Calcium tablets
Adequate well-balanced diet
Calcitonin
(subcutaneous injection)
Estrogen
Sunshine
Vitamin D
Vitamin D
Exercise
Weight-bearing
activity essential
Walking
Mild
athletic
activity
Soft shoes with
cushioned insoles

Osteoporosis

Treatment

- Treat underlying cause and Treat fractures
- Bisphosphonates drugs which responsible for decrease bone loss hence reduce risk of fracture.
- Estrogen antagonists which act as inhibitor for spine fractures.
- Calcitonin which responsible for prevention spinal fracture in postmenopausal women.
- Parathyroid hormone which stimulates formation of bones.
- Calcium supplements., Vitamin D supplements

References

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1) Clinical guidelines for the prevention and treatment of osteoporosis: summary statements and recommendations from the Italian Society for Orthopaedics and Traumatology Published online 2017 Oct 20
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Thank You!