



SDL - Osteoporosis and Vitamin D Deficiency

Color Index

IMPORTANT

NOTES

GOLD

EXTRA

OBJECTIVES

- Recognize the epidemiology of osteoporosis and vitamin D deficiency in Saudi Arabia
- Understand the causes, diagnosis and treatment of osteoporosis
- Understand the causes, diagnosis and treatment of vitamin D deficiency

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Sources	

Osteoporosis Definition and Epidemiology:

Defined by the National Osteoporosis Foundation as a chronic, progressive disease characterized by low bone mass, microarchitecture deterioration of bone tissue, bone fragility, and a consequent increase in fracture risk.

Epidemiology: The prevalence of osteoporosis and osteopenia in Saudi Arabia (KSA) is 37.8% and 28.2% in men and women above the age of 50 years.

Risk Factors of Osteoporosis:

- Excessive alcohol intake (> 4 drinks per day for men; > 2 drinks per day for women), caffeine intake (> 2.5 units [e.g., cups of coffee] per day), and tobacco use (any smoking)
- Family history of osteoporotic fracture
- Gonadal hormone deficiency
- Immobilization and inadequate activity
- Increasing age
- Low body weight (< 58 kg [128 lb])
- Low calcium or vitamin D intake
- Low level of physical activity
- Personal history of fracture
- Smoking
- White or Asian race

Causes of Osteoporosis:

Primary Causes	Secondary causes (Exclude secondary causes especially in younger individuals and men)
Type 1: post-menopausal Type 2: senile (old age)	<ul style="list-style-type: none">• CNS disorders (e.g., epilepsy, multiple sclerosis, Parkinson disease, spinal cord injury, stroke)• Endocrine disorders (adrenal insufficiency, Cushing syndrome, hyperparathyroidism, hyperthyroidism, hypogonadism, type 1 diabetes mellitus)• Gastrointestinal disorders (celiac, IBD, short gut)

syndrome)

- **Renal insufficiency or renal failure**
- **Liver disease** (severe)
- **Nutrition disorders** (alcoholism, anorexia nervosa/bulimia, malnutrition, vitamin A excess, vitamin D deficiency)
- **Rheumatoid arthritis**
- **Systemic lupus erythematosus**
- **Chronic obstructive pulmonary disease**
- **Medications:** Glucocorticoids, Anticonvulsants, Chemotherapeutics, Proton pump inhibitors, Selective serotonin reuptake inhibitors

Presentation of Osteoporosis:

Osteoporosis is often referred to as the “silent disease” as bone loss is gradual and painless, and there are usually no symptoms to indicate a person is developing osteoporosis. Most commonly, osteoporotic fractures occur at the spine, the wrist or the hip, although osteoporotic fractures can occur in other bones as well.

Diagnosis of Osteoporosis:

Osteoporosis is diagnosed radiographically based on bone mineral density (BMD) determinations from dual energy x-ray absorptiometry (DEXA) assessment. The World Health Organization (WHO) established commonly accepted definitions of osteoporosis and osteopenia

Diagnostic Criteria for Osteoporosis and Osteopenia in Postmenopausal Women and Men Older Than 50 Years

CATEGORY	BONE MASS (BMD DERIVED FROM DEXA MEASUREMENT)
Normal	Spinal or hip BMD within 1.0 SD below the young adult female reference mean (T-score ≥ -1.0)
Low bone mass (osteopenia)	Spinal or hip BMD between 1.0 and 2.5 SDs below the young adult female reference mean (T-score < -1.0 and > -2.5)
Osteoporosis	Spinal or hip BMD ≥ 2.5 SDs below the young adult female reference mean (T-score ≤ -2.5)
Severe/established osteoporosis	BMD ≥ 2.5 SDs below the young adult female reference mean and the presence of one or more fragility fractures

BMD = bone mineral density; DEXA = dual energy x-ray absorptiometry; SDs = standard deviations.

Information from reference [6](#).

Screening of Osteoporosis:

The U.S. Preventive Services Task Force (USPSTF) recommends screening all women 65 years and older.

DEXA of the hip and lumbar spine is the preferred assessment method. The USPSTF also advises screening women younger than 65 years whose 10-year fracture risk is greater than or equal to that of a 65-year-old white woman without additional risk factors.

The FRAX Fracture Risk Assessment Tool was used by the USPSTF as a method of determining increased fracture risk for these women.

Treatment of Osteoporosis:

Who to Treat?

The National Osteoporosis Foundation recommends treatment of postmenopausal women and men with a personal history of hip or vertebral fracture, a T-score of -2.5 or less, or a combination of low bone mass (T-score between -1 and -2.5) and a 10-year probability of hip fracture of at least 3% or any major fracture of at least 20% as calculated by the FRAX Fracture Risk Assessment Tool.

Nonpharmacological Treatment:

Alcohol moderation ≤ 4 drinks per day for men or ≤ 2 drinks per day for women

Decreased caffeine intake ≤ 2.5 cups of coffee or ≤ 5 cups of tea per day

Multicomponent exercise with strength and balance training

Smoking cessation

Sunlight/ultraviolet exposure 30 minutes per day, 5 days per week

Vitamin D supplementation 800 IU per day

Pharmacological Treatment:

Bisphosphonates (first line)

Route of Administration:

Oral: Alendronate, Risedronate, Ibandronate

Oral bisphosphonates should be taken only with water and a wait of at least 30 minutes before reclining or ingesting other medication or food. This decreases upper gastrointestinal adverse effects and allows for appropriate absorption.

Intravenous: Zoledronic acid, Ibandronate

Zoledronic acid is taken yearly and ibandronate is taken every three months. Although these medications are expensive, they are useful for high-risk patients who are unable to tolerate or adhere to oral therapy

Side effects:

Gastrointestinal upset

Osteonecrosis of the jaw and atypical femoral fractures are rare complications of bisphosphonate therapy that are associated with longer duration of use. Clinicians should consider discontinuing bisphosphonate therapy after five years in women without a personal history of vertebral fractures

Raloxifene

Route of Administration: Intravenous

Side effects:

Raloxifene is commonly associated with increased vasomotor symptoms. It is associated with an increased risk of venous thromboembolism

Raloxifene is associated with a decreased risk of invasive breast cancer.

The best candidates for raloxifene are postmenopausal women with osteoporosis who are unable to tolerate bisphosphonates, have no vasomotor symptoms or history of venous thromboembolism, and have a high breast cancer risk score

Calcitonin

Route of Administration: nasal spray

not considered first-line treatment for osteoporosis because more effective medications are available. There have also been reports of increased cancer rates associated with use of calcitonin.

Denosumab

Route of Administration: Subcutaneous

It appears to be a reasonable alternative for persons whose condition does not improve with bisphosphonates. Renal insufficiency is a listed caution, but denosumab appears to be safe for patients with chronic kidney disease stages 1 to 3.

Vitamin D Deficiency Definition and Epidemiology:

Definition:

The National Academy of Medicine considers a serum 25-hydroxyvitamin D (25-OH-D) level of 12 to 20 ng per mL (30 to 50 nmol per L) as the normal range for adequate exposure to vitamin D to maintain bone health. Individuals with levels less than 12 ng per mL will usually be deficient, and 97.5% of individuals with a serum level higher than 20 ng per mL have adequate vitamin D exposure.

Epidemiology:

The currently available literature on the Saudi Arabian population suggests that the Vitamin D deficiency is around 60%.

Vitamin D Deficiency Risk Factors:

- Having dark skin
- Being elderly
- Being overweight or obese
- Not eating much fish or dairy
- Living far from the equator where there is little sun year-round
- Always using sunscreen when going out
- Staying indoors

Vitamin D Deficiency Presentation:

- Bone discomfort or pain (often throbbing) in low back, pelvis, lower extremities
- Increased risk of falls and impaired physical function
- Muscle aches
- Proximal muscle weakness
- Symmetric low back pain in women

Vitamin D Deficiency Diagnosis:

The most accurate way to measure how much vitamin D is in your body is the 25-hydroxy vitamin D blood test. A level of 20 nanograms/milliliter to 50 ng/mL is considered adequate for healthy people. A level less than 12 ng/mL indicates vitamin D deficiency

Vitamin D Deficiency Treatment:

In persons with vitamin D deficiency, treatment may include oral ergocalciferol (vitamin D₂) at 50,000 IU per week for eight weeks. After vitamin D levels normalize, experts recommend maintenance dosages of cholecalciferol (vitamin D₃) at 800 to 1,000 IU per day from dietary and supplemental sources.

References:

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