AN OVERVIEW OF OSTEOPOROSIS PREVENTION AND TREATEMENT FACTS

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ABSTRACT

Osteoporosis is considered as a major public health issue. It is a systematic skeletal disease characterized by low bone mass and micro-architectural deterioration of bone tissue, with a consequent increase in bone fragility and susceptibility to fracture. Also this disease seriously affects the quality of life time of elderly people particularly in the agricultural based working women's in rural area of Tamilnadu and also postmenopausal females are more vulnerable to osteoporosis potentially due to the lower level of oestrogen and it is estimated that 30% of all postmenopausal females suffered from osteoporosis and osteoporosis-related fractures. This paper gives a brief overview of osteoporosis bone fractures happened for women.

Key Words: *Osteoporosis, skeletal disease, fragility, postmenopausal and oestrogen.*

1. INTRODUCTION

Osteoporosis is characterized by a decrease in the density of bone, decreasing its strength, leading to a marked decrease in quality of life, dependency of walking aids or help from others and excess mortality. Various techniques are used for measuring the Bone Mineral Density (BMD); this is the amount of bone mass per unit volume or per unit area. BMD is measured by different techniques like Dual-Energy X-ray Absorptiometry (DEZA), Quantitative UltraSound(QUS), Quantitative Computed Tomography(QCT) to predict the risk for bone fracture. Various pharmacological agents have been developed for osteoporotic fractures and antiresorptive therapies such as bisphosphonates (i.e. alendronate (ALE), risedronate (RIS), clodronate (COL)), human parathyroid hormone (PTH), selective estrogen (EST) receptor modulators (raloxifene (RAL)) are probably the most popular ones . Bisphosphonates is the first-line therapy that is currently available for postmenopausal osteoporosis and they act their functions by inhibiting the status of bone turnover.

Osteoporosis happens when bone density decreases and the body stops producing as much bone as it did before. It can affect both males and females, but it is most likely to occur in women after menopause, because of the sudden decrease in estrogen, the hormone that normally protects against osteoporosis. As the bones become weaker, there is a higher risk of a fracture during a fall or even a fairly minor knock.

2. Fast facts on osteoporosis:

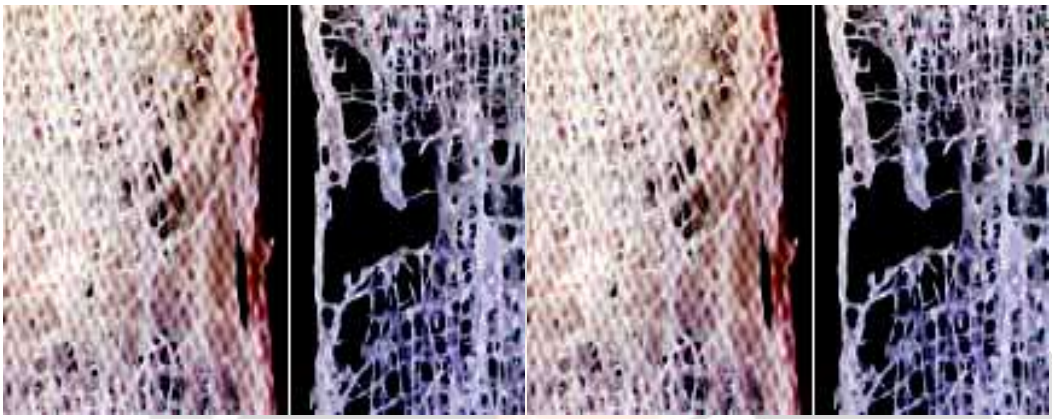
Here are some key points about osteoporosis. More detail is in the body of this article.

- Osteoporosis affects the structure and strength of bones and makes fractures more likely, especially in the spine, hip, and wrists.
- It is most common among females after menopause, but smoking and poor diet increase the risk.
- There are often no clear outward symptoms, but weakening of the spine may lead to a stoop, and there may be bone pain.
- A special x-ray-based scan, known as DEXA, is used for diagnosis.

- Treatments include drugs to prevent or slow bone loss, exercise, and dietary adjustments, including extra calcium, magnesium and vitamin D.

What is osteoporosis?

"Osteoporosis" literally means "porous bones." The bones become weaker, increasing the risk of fractures, especially in the hip, spinal vertebrae, and wrist. Bone tissue is constantly being renewed, and new bone replaces old, damaged bone. In this way, the body maintains bone density and the integrity of its crystals and structure. Bone density peaks when a person is in their late 20s. After the age of around 35 years, bone starts to become weaker. As we age, bone breaks down faster than it builds. If this happens excessively, osteoporosis results.



- Normal bone on left
- Osteoporotic bone on right

Treatment of osteoporosis:

Treatment aims to:

- slow or prevent the development of osteoporosis
- maintain healthy bone mineral density and bone mass
- prevent fractures
- reduce pain
- maximize the person's ability to continue with their daily life

This is done through preventive lifestyle measure and the use of supplements and some drugs.

3. Drug therapy

Drugs that can help prevent and treat osteoporosis include:

- Bisphosphonates: These are antiresorptive drugs that slow bone loss and reduce fracture risk.
- Estrogen agonists or antagonists, also known as selective estrogen-receptor modulators, SERMS), for example, raloxifene (Evista): These can reduce the risk of spine fractures in women after menopause.
- Calcitonin (Calcimar, Miacalcin): This helps prevent spinal fracture in postmenopausal women, and it can help manage pain if a fracture occurs.

- Parathyroid hormone, for example, teriparatide (Forteo): This is approved for people with a high risk of fracture, as it stimulates bone formation.
- RANK ligand (RANKL) inhibitors, such as denosumab (Xgeva): This is an immune therapy and a new type of osteoporosis treatment.

Other types of estrogen and hormone therapy may help.

The future of osteoporosis therapy:

In future, treatment may include stem cell therapy. In 2016, researchers found that injecting a particular kind of stem cell into mice reversed osteoporosis and bone loss in a way that could, potentially, benefit humans too.

Findings published in 2015 suggested that growth hormone (GH) taken with calcium and vitamin D supplements could reduce the risk of fractures in the long term.

Also in 2015, researchers in the United Kingdom (U.K.) found evidence that a diet containing soy protein and isoflavones may offer protection from bone loss and osteoporosis during menopause.

Scientists believe that up to 75 percent of a person's bone mineral density is determined by genetic factors. Researchers are investigating which genes are responsible for bone formation and loss, in the hope that this might offer new ways of preventing osteoporosis in future.

Signs and symptoms:

Bone loss that leads to osteoporosis develops slowly. There are often no symptoms or outward signs, and a person may not know they have it until they experience a fracture after a minor incident, such as a fall, or even a cough or sneeze.

Commonly affected areas are the hip, a wrist, or spinal vertebrae. Breaks in the spine can lead to changes in posture, a stoop, and curvature of the spine.

Causes and risk factors:

A number of risk factors for osteoporosis have been identified. Some are modifiable, but others cannot be avoided.

Unavoidable factors:

Non-modifiable risk factors include:

- Age: Risk increases after the mid-30s, and especially after menopause.
- Reduced sex hormones: Lower estrogen levels appear to make it harder for bone to reproduce.
- Ethnicity: White people and Asians are more susceptible than other ethnic groups.
- Bone structure: Being tall (over 5 feet 7 inches) or slim (weighing under 125 pounds) increases the risk.
- Genetic factors: Having a close family member with a diagnosis of hip fracture or osteoporosis makes osteoporosis more likely.
- Fracture history: Someone who has previously experienced a fracture during a low-level injury, especially after the age of 50 years, is more likely to receive a diagnosis.

Diet and lifestyle choices:

Modifiable risk factors include:

- eating disorders, such as anorexia or bulimia nervosa, or orthorexia

- tobacco smoking
- excessive alcohol intake
- low levels or intake of calcium, magnesium, and vitamin D, due to dietary factors, malabsorption problems, or the use of some medications
- inactivity or immobility

Weight-bearing exercise helps prevent osteoporosis. It places stress on the bones, and this encourages bone growth.

Drugs and health conditions:

Some diseases or medications cause changes in hormone levels, and some drugs reduce bone mass.

Diseases that affect hormone levels include hyperthyroidism, hyperparathyroidism, and Cushing's disease.

Research published in 2015 suggests that transgender women who receive hormone treatment (HT) may be at higher risk of osteoporosis. However, using anti-androgens for a year before starting HT may reduce this risk. Transgender men do not appear to have a high risk of osteoporosis. More research is needed to confirm this.

Conditions that increase the risk include:

- cancer
- COPD
- chronic kidney disease
- some autoimmune diseases, such as rheumatoid arthritis and ankylosing spondylitis

Medications that raise the risk include:

- glucocorticoids and corticosteroids, including prednisone and prednisolone
- thyroid hormone
- anticoagulants and blood-thinners, including heparin and warfarin
- protein-pump inhibitors (PPIs) and other antacids that adversely affect mineral status

some antidepressant medications

some vitamin A (retinoid) medications

- thiazide diuretics
- thiazolidinediones, used to treat type 2 diabetes, as these decrease bone formation
- some immunosuppressant agents, such as cyclosporine, which increase both bone resorption and formation
- aromatase inhibitors and other treatments that deplete sex hormones, such as anastrozole, or Arimidex

Glucocorticoid-induced osteoporosis is the most common type of drug-induced osteoporosis.

Prevention:

Certain alterations to lifestyle can reduce the risk of osteoporosis.

Calcium and vitamin D:

Calcium is essential for bones, and ensuring an adequate calcium intake is important.

Which Foods Have the Most Calcium?

Drinking a glass of vitamin D-fortified milk is one of the best ways to get your calcium. Other dairy products vary in their calcium content. Fortified foods, such as cereals and orange juice, can also provide a lot of calcium.

Sources Of Vitamin-D:

Good sources of vitamin D include natural sunlight, fortified milk, cheese, butter, cereal, and fish.

How Is Osteoporosis Treated and Prevented?

The goal of osteoporosis treatment is the prevention of bone fractures by stopping bone loss and by increasing bone density and strength. Although early detection and timely treatment of osteoporosis can substantially decrease the risk of future fracture, none of the available treatments for osteoporosis are complete cures. In other words, it is difficult to completely rebuild bone that has been weakened by osteoporosis. Therefore, prevention of osteoporosis is as important as treatment.

Prevention and Treatment: Exercise:

Weight-bearing exercise can help you build bone and maintain it. That includes walking, jogging, tennis, and other activities where you move the full weight of your body. Using small weights in many different activities helps bones. Women who walk just a mile a day have four to seven more years of bone reserve, researchers have found.

Tests and diagnosis:

A doctor will consider the patient's family history and their risk factors. If they suspect osteoporosis, they will request a scan, to measure bone mineral density (BMD).

Bone density scanning uses a type of x-ray technology known as dual-energy X-ray absorptiometry (DEXA) and bone densitometry.

Two types of device can carry out a DEXA scan:

- A central device: A hospital-based scan measures hip and spine bone mineral density while the patient lies on a table.
- A peripheral device: A mobile machine that tests bone in the wrist, heel, or finger.

DEXA test results:

The results of the test are given as a DEXA T-score or a Z-score. The T-score compares the patient's bone mass with peak bone mass of a younger person.

- -1.0 or above is normal
- from -1.0 to -2.5 suggests mild bone loss
- -2.5 or below indicates osteoporosis

Other tests:

A lateral vertebral assessment (LVA) may be recommended for an older patient who is more than one inch shorter than they used to be, or who has back pain that is not related to another condition.

An ultrasound scan of the heel bone is another way to assess for osteoporosis. It can be carried out in the primary care setting. It is less common than DEXA, and the measurements cannot be compared against DEXA T-scores.

Build Bones in Your Youth:

Healthy habits as a child or teenager can pay off years later with stronger bones. Young people can build their bones by eating calcium-rich foods, getting enough vitamin D (through sunshine or diet), and exercising regularly. Here are the recommended daily intakes for calcium by age:

Under 1 year: 200-260 mg
1-3 years: 700 mg, 4-8 years: 1,000 mg
9-18 years: 1,300 mg,
19-50 years: 1,000 mg
51-70 men: 1,000 mg
51+ women: 1,200 mg
71+ years: 1,200 mg

By age 30, the average woman has built 98% of her peak bone mass.

4. CONCLUSION

As bones become weaker, fractures occur more frequently, and, with age, they take longer to heal. This can lead to ongoing pain and loss of stature, as bones in the spine begin to collapse. A broken hip can be hard to recover from, and the person may no longer be able to live independently. It is important to take action to prevent falls among people with osteoporosis. Anyone who is concerned that they may be at risk of osteoporosis should ask their doctor about screening.

5. REFERENCES

[1]. Durrant L, Farrell, V. and Houtkooper, L.Eating for Bone Health. AZ1250, 2017. http://ag.arizona.edu/pubs/health/az1250.

[2]. Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D, and Fluoride. Institute of Medicine, Food and Nutrition Board, National Academy Press, 1997.

[3]. Farrell, V. and L. Houtkooper. Calcium and calorie content of selected foods. AZ1128, 2017. http://ag.arizona.edu/pubs/

health/az1128.pdf

[4]. Farrell, V., L. Houtkooper, and V. Mullins. Calcium Supplement Guidelines. AZ1042, 2017. http://ag.arizona.edu/pubs/

health/az1042.pdf

[5]. Farrell, V. and S. Hoelscher-Day. Vitamin D for Healthy Bones. AZ1570, 2017.http://ag.arizona.edu/pubs/health/az1570.pdf

[6]. Lohman T., Going S., Houtkooper L., Melcalfe L., Antoniotti- Guido T., Stanford V. The Best Book Exercise Program for Osteoporosis Prevention, Fourth Edition. Human Kinetics: Tucson, AZ: 2017.