Available online on 29.06.2019 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Review Article

A Review on Study on Osteoporosis and Impact of Drugs for its Management

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ABSTRACT

Osteoporosis is characterized by low bone mineral density (BMD) and loss of the structural and biomechanical properties that are required to maintain bone homeostasis. Physicians are knowledgeable about the association of osteoporosis with aging, postmenopausal status, and secondary causes, including chronic illnesses or lifestyle issues that promote osteoporosis. Building strong and healthy bones requires an adequate dietary intake of calcium beginning in childhood and adolescence for both sexes. Most importantly, however, a high dietary calcium intake or taking calcium supplements alone is not sufficient in treating osteoporosis and should not be viewed as an alternative to or substituted for more potent prescription medications for osteoporosis.

Keywords: BMD, Osteoporosis, calcium supplements, skeletal disease.

Article Info: Received 11 April 2019; Review Completed 13 June 2019; Accepted 17 June 2019; Available online 29 June 2019

Cite this article as:

Dhoot IK, Singh CJ, A Review on Study on Osteoporosis and Impact of Drugs for its Management, Journal of Drug Delivery and Therapeutics. 2019; 9(3-s):1126-1128 **http://dx.doi.org/10.22270/jddt.v9i3-s.2998**

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1. INTRODUCTION:

Osteoporosis afflicts 10 million Americans, and another 30 million Americans have low bone mass that puts them at risk for development of osteoporosis1. The overall risk for a 50-year-old Caucasian or Asian woman to sustain an osteoporotic fracture during her lifetime is 50%. While men, African Americans, and Hispanics have lower risks, the health impact is still substantial. One-third of all hip fractures occur in men, and with our aging populace hip fracture incidence in men will eventually approach that of women1. A femoral neck or trochanteric fracture is associated with mortality of approximately 20%[1]

2. DIAGNOSIS:

Osteoporosis diagnostics can be complicated. The World Health Organization (WHO) defined osteoporosis as a systemic skeletal disease characterized by low bone mass with microarchitectural deterioration of bone tissue, thus increasing bone fragility and susceptibility to fracture[1]. For screening purposes, osteoporosis was defined by the WHO as a bone mineral density (BMD) at any site equal to or greater that 2.5 standard deviations below the fracture resistant mean peak bone mass of young adulthood.

3. SIGN 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[3] 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[4].
- Breaks in the spine can lead to changes in posture, a stoop, and curvature of the spine.

4. CAUSES OF BONE FRAGILE:

Your skeleton is an active vital organ. It keeps you healthy through a constant process of repair, renewal, and mineral release. This process is called remodeling. The bone remodeling cycle consists of two distinct stages:

(1) bone resorption[5] (breakdown and removal) and

(2) bone formation (generation of new bone).

During resorption, cells on the bone's surface called osteoclasts dissolve bone tissue, releasing it into the bloodstream and leaving behind tiny pits, or cavities. Then, during formation, cells called osteoblasts fill these cavities with new bone tissue. In normal bone, resorption and formation are in lock step, with one matching the other.[6]

5. MEDICATION TO PREVENT FRAGALITY FRACTURES:

Here are many medications available to treat osteoporosis and reduce the risk of fracture. They fall into two basic

categories: antiresorptives and anabolics. Antiresorptive drugs include bisphosphonates (alendronate, ibandronate, risedronate, zoledronic acid), denosumab, calcitonin, estrogen/estrogen-progestin, an estrogen agonist/antagonist (raloxifene), and a tissue specific estrogen complex (estrogen/bazedoxifene).[7-15]

6. MEDICATION FOR TREATMENT OF OSTEOPOROSIS:

Bisphosphonates are the most common medications prescribed for osteoporosis treatment. These include:

- Alendronate (Fosamax)[9]
- Risedronate (Actonel)[10]
- Ibandronate (Boniva)[12]
- Zoledronic acid (Reclast)[14]

Hormones, such as estrogen, can play a role in osteoporosis prevention and treatment. However, there has been some concern about potential side effects tied to the use of hormone therapy.[16] Current recommendations say to use the lowest dose of hormones for the shortest period of time.

7. DRUG THERAPY:

Drugs that can help prevent and treat osteoporosis include:

- Bisphosphonates: These are antiresorptive drugs that slow bone loss and reduce fracture risk.[9]
- 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.[17]
- Calcitonin (Calcimar, Miacalcin): This helps prevent spinal fracture in postmenopausal women, and it can help manage pain if a fracture occurs.[11]
- Parathyroid hormone, for example, teriparatide (Forteo): This is approved for people with a high risk of fracture, as it stimulates bone formation.
- Monoclonal antibodies[18] (denosumab, romosozumab): These are immune therapies given to some postmenopausal women with osteoporosis. Romosuzumab carries a black box warning due to possible adverse effects.

7.1 Specific Drug Treatments Include:

- Bisphosphonates[9]
- Denosumab
- Parathyroid Hormone
- Hormone Therapy
- SERMs[19] (Selective Estrogen Receptor Modulators)

8. CONSEQUENCES OF OSTEOPOROSIS:

Osteoporotic bone fractures are responsible for considerable pain, decreased quality of life, lost workdays, and disability. Up to 30% of patients suffering a hip fracture will require long-term nursing-home care. Elderly patients can develop pneumonia and blood clots in the leg veins that can travel to the lungs (pulmonary embolism) due to prolonged bed rest after the hip fracture. Osteoporosis has even been linked with an increased risk of death.[20] Some 20% of women with a hip fracture will die in the subsequent year as an indirect result of the fracture. In addition, once a person has experienced a spine fracture due to osteoporosis, he or she is at very high risk of suffering another such fracture in the near future (next few years).[21] About 20% of postmenopausal women who experience a vertebral fracture will suffer a new vertebral fracture of bone in the following year.

9. CONCLUSION:

The goal of treatment of osteoporosis is the prevention of bone fractures by reducing bone loss or, preferably, by increasing bone density and strength. Although early detection and timely treatment of osteoporosis can substantially decrease the risk of future fractures, 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.

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