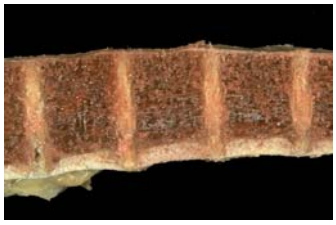
OSTEOPOROSIS

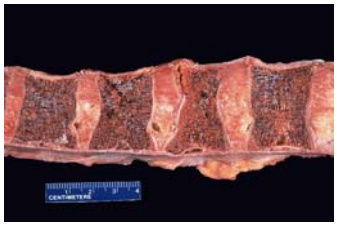
Dr. Sahni BS DHMS Hons, PGRT (BOM), FF Hom Deputy Chief Medical Officer (H), ONGC Hospital Panvel-410221, Navi Mumbai, INDIA	**Website:** www.homoeopathyclinic.com **Email:** drsahnibs@vsnl.com

Introduction

"Osteoporosis" is a generic term used to define a specific form of generalized "osteopenia" which signifies "too little calcified bone". This is a state of reduced bone mass per unit volume with a normal ratio of mineral to matrix. It is a condition of generalized skeletal fragility in which bone is sufficiently weak that fractures occur with minimal trauma. This trauma is often no more than is applied by routine daily activity. According to classic histological criteria, osteoporosis is characterized by a reduction in trabecular bone mass in relation to the total area of the histologic section, and a ratio of mineral to organic matrix that approximates that of normal bone. To the radiologist, osteoporosis represents increased radiolucency of bones (particularly of the vertebrae). This definition is somewhat crude and misleading since a loss of over 30% of bone mineral is apparently necessary before the trained radiologist is certain of abnormal de-mineralization. With accurate non-invasive bone mass measurements came the opportunity for early diagnosis. Bone mineral density (BMD) of patients with osteoporotic fractures is generally lower than that of age-matched non-fractured controls, but substantial overlap in this measurement has proven it incapable of predicting accurately the presence of osteoporotic fractures.

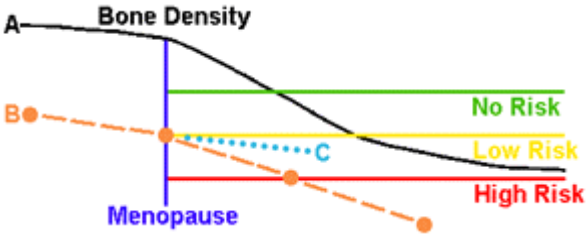


Normal Vertebral Bone



Vertebral bone with osteoporosis demonstrates decreased bone mass with fewer and narrower bony spicules.

Recently, a definition of osteoporosis has been proposed that is based exclusively on bone mass. It is suggested that a **BMD** value of 2.5 SD below the average for healthy young adult women is diagnostic of this condition. Using this value, approximately 30% of postmenopausal women would be diagnosed with osteoporosis, which gives a realistic projection of lifetime fracture rates.



This diagram illustrates changes in bone density with aging in women. The normal curve (A) steepens following menopause, but even by old age the risk for fracture is still low. A woman who begins with diminished bone density (B) even before menopause is at great risk, particularly with a more accelerated rate of bone loss. Interventions such as postmenopausal estrogen (with progesterone) therapy, the use of drugs such as the non-hormonal compound alendronate that diminishes osteoclast activity, and the use of diet and exercise regimens can help to slow bone loss (C) but will not stop bone loss completely or restore prior bone density.

Albright and Reifenstein proposed in 1948 that primary osteoporosis comprises two separate entities, one related to menopausal estrogen loss and the other to aging. Riggs suggested the terms Type I osteoporosis, to signify a loss of trabecular bone after menopause, and Type II osteoporosis, to represent a loss of cortical and trabecular bone in men and women as the end result of age-related bone loss. Whereas the Type I disorder directly results from lack of endogenous estrogen, Type II osteoporosis reflects the composite influences of long-term remodeling efficiency, calcium and vitamin D metabolism, intestinal and renal mineral handling, and parathyroid hormone (PTH) secretion. In addition, the traditional model allows for secondary forms of osteoporosis, which include skeletal fragility seen with systemic illness, intestinal malabsorption, or medication exposure.

Bone mass in an adult equals its maximum level at skeletal maturity (peak bone mass) minus that which has been subsequently lost. A woman who smoked and consumed alcohol regularly and experienced prolonged amenorrhea, bed-rest, anorexia nervosa, or systemic illness during adolescence would likely enter adult life with a lower bone mass than would be predicted from her genetic or constitutional profile. Repeated pregnancies and lactation would further reduce her bone mass. If she then lost bone at a normal rate, her skeleton would still be in jeopardy simply because of the deficit in peak bone mass. Furthermore, two recently menopausal women could have the identical low BMD, in the first case caused by assorted insults during adolescence, and in the second because of menopausal bone loss. Thus, the mechanisms by which osteopenia developed cannot be predicted from a simple bone mass measurement. Therefore, it is more appropriate to consider osteoporosis the product of multiple genetic, physical, hormonal, and nutritional factors acting alone or in concert.

Causes Of Osteoporosis

The rebuilding of the protein-matrix of bones depends on

1. An adequate amount of body protein—this is deficient with a grossly deficient protein diet or with prolonged protein loss.
2. A sufficiency of osterogens, androgens and to a less extent of thyroid hormone
3. The daily use of bones, so that prolonged bed rest is harmful

Increased destruction of the protein matrix (osteoclasis) occurs with the prolonged administration of large doses of coticosteriods and corticotrophin (ACTH) as in the treatment of disseminated lupus erythematosus or advanced Rheumatoid Disease as well as with Cushing's syndrome and prolonged hyperthyroidism.

Clinical Features

Majority of patients with osteoporosis are asymptomatic and are identified incidentally by X-rays taken for other purposes. Episodic backache is a characteristic symptom of Osteoporosis. Symptoms when they occur are of two types. Immediately after a vertebral crush fracture there may be sharp, severe pain aggravated by movement over the involved region. The pain may be spasmodic and characteristically radiates anteriorly into various part of abdomen, pelvis or legs. This generally subsides over few weeks regardless of therapy. Some patients have chronic, dull, diffuse back pain located several centimeters to one or both sides of the midline in the lower thoracic or lumbar region. Careful palpation usually detects associated spasm of the paravertebral muscles. Neurological signs due to nerve root compression are uncommon.

Vertebral collapse causes a loss of height and may lead to dorsal kyphosis (dowager's.hump). Progressive spinal deformity usually leads to downward angulation of ribs and a narrowing of the normal gap between lower ribs and iliac crest. In the senile group especially there is an increased susceptibility to fracture of the femoral neck and the lower end of the radius.

Diagnosis

Dual energy x-ray absorptiometry (DEXA) is the most widely used investigation for diagnosis of Osteoporosis.

Bone turnover markers play a small role in diagnosis of, osteoporosis but are of importance in assessing early response to therapy. Commonly used bone markers are:

(i) Serum ostepcalcin
(ii) Urinary excretion of pyridium cross links of collagen
(iii) Urinary excretion of C and N teleopeptides of collagen
(iv) Serum tartrate resistant acid phosphatase (v) Scrum C and N propeptides of type I collagen

Routine laboratory investigations for all patients with osteoporosis include CBC, Serum calcium, Total alkaline phosphates, serum ceatinine, plasma glucose (fasting/ post prandial) and routine urine examination.

If you're a woman, it is recommends that you have a **bone density test** if you aren't taking estrogen and any of the following conditions apply to you:

- You use medications such as prednisone that can cause osteoporosis.
- You have type 1 diabetes (formerly called juvenile or insulin-dependent diabetes), liver disease, kidney disease or a family history of osteoporosis.
- You experienced early menopause.
- You're postmenopausal, older than 50, and have at least one risk factor for osteoporosis.
- You're postmenopausal, older than 65, and have never had a bone density test.

Doctors don't generally recommend osteoporosis screening for men because the disease is less common in men than it is in women.

Prognosis

The condition is for most advanced before symptoms arise; it has been found that over 60% of the vertebrae have been adsorbed before X-Ray changes are evident. In the absence of treatment the condition is progressive. Repeated pregnancies aggravate the disease.

Prevention

The following measures can greatly reduce your risk of osteoporosis. If you already have osteoporosis, these steps can help prevent your bones from becoming weaker.

- **Get adequate calcium and vitamin D.** The amount of calcium you need to stay healthy changes over your lifetime. Your body's demand for calcium is greatest during childhood and adolescence, when your skeleton is growing rapidly, and during pregnancy and breast-feeding. Postmenopausal women and older men also need to consume more calcium. As you age, your body becomes less efficient at absorbing calcium. Older adults are also more likely to have chronic health problems or to take medications that interfere with calcium absorption.

Pre-menopausal women and postmenopausal women who use HT should consume at least 1,200 milligrams (mgs) of calcium and 400 international units (IU) of vitamin D every day. Postmenopausal women not using HT and those at risk of steroid-induced osteoporosis should get 1,500 mgs of calcium and 800 IU of vitamin D daily.
Men under age 65 should consume 1,000 mgs of calcium every day and men over age 65, 1,500 mgs. Good food sources of calcium include skim, low-fat and whole milk; low-fat plain yogurt; Swiss, cheddar and ricotta cheese; broccoli; canned salmon with the bones; and orange juice and other products, such as tofu, fortified with calcium.

If you find it difficult to get this much calcium from your diet because you can't eat dairy products, for example, try calcium supplements. Supplements are as effective as calcium from food, are inexpensive, and generally are well tolerated and well absorbed if taken properly. Sometimes calcium supplements can be constipating. If this is a problem for you, drink more water and try using a fiber supplement. In addition, check the type of calcium you're using. Calcium phosphate and calcium citrate tend to be less constipating. Calcium and vitamin D supplements are most effective when taken in divided doses with food. Look for calcium and vitamin D supplements that are combined in a single tablet.

- **Exercise.** Exercise can help you build strong bones and slow bone loss. Exercise will benefit your bones no matter when you start, but you'll gain the most benefits if you start exercising regularly when you're young and continue to exercise throughout your life. Combine strength-training exercises with weight-bearing exercises. Strength training enables you to strengthen muscles and bones in your arms and upper spine, while weight-bearing exercises — such as walking, jogging, running, stair climbing, skipping rope, skiing and impact-producing sports — mainly affect the bones in your legs, hips and lower spine.
- **Don't smoke.** Smoking is bad for your bones as well as for your heart and lungs. Smoking increases bone loss, perhaps by decreasing the amount of estrogen a woman's body makes and by reducing the absorption of calcium in your intestine. The effects on bone of secondhand smoke aren't yet known.
- **Consider hormone replacement therapy.** Hormone replacement therapy can reduce a woman's risk of osteoporosis during and after menopause. But because of the risk of side effects, discuss the options with your doctor and decide what's best for you. Testosterone replacement therapy works only for men with osteoporosis caused by low testosterone levels. Taking it when you have normal testosterone levels won't increase bone mass.
- **Avoid excessive alcohol.** Consuming more than two alcoholic drinks a day may decrease bone formation and reduce your body's ability to absorb calcium. There's no clear link between moderate alcohol intake and osteoporosis.
- **Limit caffeine.** Moderate caffeine consumption — about two to three cups of coffee a day — won't harm you as long as your diet contains adequate calcium.

Medications That Cause Bone Loss

The long-term use of glucocorticoids (medications prescribed for a wide range of diseases, including arthritis, asthma, Crohn's disease, lupus, and other diseases of the lungs, kidneys, and liver) can lead to a loss of bone density and fractures. Other forms of drug therapy that can cause bone loss include long-term treatment with certain antiseizure drugs, such as phenytoin and barbiturates; gonadotropin releasing hormone analogs used to treat endometriosis; excessive use of aluminum-containing antacids; certain cancer treatments; and excessive thyroid hormone.

It is important to discuss the use of these drugs with your physician, and not to stop or alter your medication dose on your own.

Treatment

Prevention management of osteoporosis has to be focused on the following:

- Preventing fractures
- Stabilize, or achieve a moderate increase in, bone mass
- Relieve symptoms of fractures and skeletal deformity
- Maximize physical function (for example, halt progressive deformity)

Health education starting at school level and using the lay press would be of great benefit in the long run. Dietary advice, importance of regular exercise, prevention of falls and avoidance of known "bone toxins" would be very useful.

The most common Homoeopathic Remedies that can treat successfully osteoporosis are:

1. **Cal Carb:** Pain in back as if sprained, can scarcely rise from overlifting, Cannot sit upright in the chair from weakness of back, cramps in calves when stretching out limbs especially during night. Most suitable to B**lood Group O** people.
2. **Calcarea Phos:** Osteoporosis of the lumbar vertebrae, pain worse least effort, soreness in sacro-iliac symphysis, as if broken.
3. **Cal Flour:** Chronic Backache, worse from strain and better from motion & warmth, post traumatic osteoporosis
4. **Osteoporosis:** Very effective in all cases of Osteoporosis.
5. **Vit-D:** Indicated in Osteoporosis, bone pains, muscle weakness.
6. **Testosterone:** Indicated in Cushing's syndrome.
7. **Oestrogen**: For menopausal women
8. **Symphytum:** Osteoporosis of vertebras, it has properties of facilitating the formation of callus in diseased bones & vertebras.
9. **Lycopodium:** Suited to old aged males. Stiff back, worse slightest exertion, Cramps in limbs during night, limbs goes to sleep, Osteoporosis of long bones & Lumbar vertebrae.
10. **Thyrodinum:** It corrects the metabolism and balances the phosphorus, calcium in the system.
11. **Cortisonum**: Most suited to steroid treated cases, Osteoporosis of Dorsal vertebras, Hip, post-traumatic. Pain aggravated in sitting position & better by movement & pressure.
12. **Bacillus Dysent** (Bach): Osteoporosis, most suitable to elderly & the debauch, sensitive to cold, backache better by heat & rest.

References

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