LOW BONE DENSITY OSTEOPOROSIS: AN ALARM AT 40+

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Abstract

Osteoporosis is a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly of the spine, hip and wrist. Osteoporosis is a global public health problem which currently affects approximately one in three women and one in five men, and is increasing in significance as the population of the world both grows in size and is living longer. Bone loss doesn't have any symptoms, and often the first sign of having osteoporosis is a fracture. For all these reasons, osteoporosis is often referred to as the "silent epidemic".Skeletal system in our body comprises of 206 bones which give a structure to our body and therefore keeping this fit, healthy and strong is of foremost importance. In men after the age of 60 yrs., bone health usually starts deteriorating which we call as osteoporosis or osteopenia. Osteopenia is the first stage of demineralisation of bones and if not corrected in time can lead to osteoporosis. Demineralisation is the process wherein calcium from the bones starts reducing leading to brittle and fragile bones causing easy breakage. In case of women, demineralisation occurs at faster rate after menopause i.e. after the age of 45. In studies among adults, one three-year study in healthy young women aged 30-42 years showed that enriching the diet with dairy foods prevented bone loss in the spine, compared with control subjects who did not increase their dietary calcium intake. So for women early measures to maintain bone health is very important aspect.

Keywords: Low Bone, Osteoporosis, Hormone levels, Protein, Vitamin D

Introduction

The skeleton needs a balanced diet containing both macro nutrients(energy, protein, fat and carbohydrate) and micro nutrients (vitamins and minerals) for its normal development and maintenance.Calcium,Phosphorus along with other minerals like Vitamin D is essential to maintain bone health, if dietary part is concerned. Along with that exercise is also equally important to give rigidity to the bones. Utilization of calcium is closely linked with that of phosphorus since most of calcium is deposited as calcium phosphate in the bones. Vitamin D is freely available from the sunlight whereas phosphorus is available through dietary sources.

Below are the listed modifications that need to be followed in order to achieve and maintain strong bones in early 30's.

- **Dietary modifications**: Foods that enhance bone health should be included in daily diet on regular basis. Some of the calcium rich food groups along with sources and values are:
- *Milk and its products*: 200 ml of whole milk will give 226 mg of calcium and 130 mg of phosphorus. Whereas 100 g of paneer will give 208 mg of calcium and 138 mg of phosphorus. Similarly curd will give 83 mg of calcium and 93 mg of phosphorus. Buttermilk being the least in phosphorus giving 30 mg and 116 mg of calcium. Yogurt gives 382 mg of phosphorus and 110 mg of calcium.[1]
- *Green leafy vegetables*: Amaranth being the richest source of calcium (800 mg/100 g) and phosphorus (50 mg/100 g) is followed by fenugreek 395 mg of calcium and 51 mg of phosphorus. Other rich sources are spinach and broccoli with 73 mg and 47 mg of calcium and 21 mg and 41 mg of phosphorus respectively.[2]
- *Nuts and oil seeds*: sesame seeds are the richest source of calcium (1450 mg/100 g) and phosphorus (570 mg/100) followed by coconut and niger seeds each giving 400 mg and 300 mg of calcium and 210 mg and 224 mg of phosphorus respectively.
- *Pulses*: Rajmah is rich source of calcium (260 mg) whereas soybean is rich source of phosphorus (690 mg), also green gram whole (moong) is good source of both the minerals.
- *Cereals*: Ragi is rich source of calcium (350 mg) and rajgira is good source of phosphorus (557 mg)
- **Exercise:** Exercise like jumping, running, dancing, walking, yoga, help young people to acquire both bone density and mass. The bones become stronger and less vulnerable to osteoporosis later in life. Exercise builds muscle tone and improves balance, thereby preventing falls, which are a major trigger of fractures. This is particularly important among older people. High level physical activity is associated with reduced risk for hip fracture (but not wrist or vertebral fractures).

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[2] O. Rutherford, "The role of exercise in prevention of osteoporosis," Physiotherapy, vol. 76, pp. 522–526, 1990. View at Google Scholar · View at Scopus

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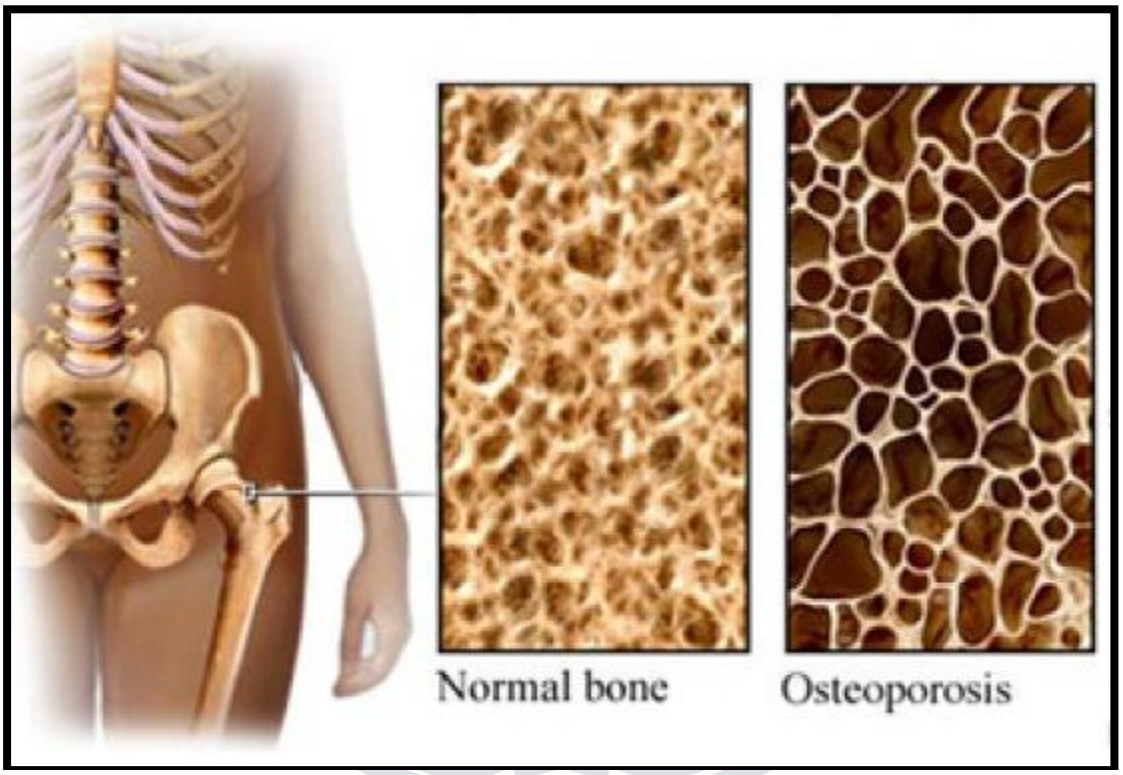
Skeletal system in our body comprises of 206 bones which give a structure to our body and therefore keeping this fit, healthy and strong is of foremost importance. In men after the age of 60 yrs., bone health usually starts deteriorating which we call as osteoporosis or osteopenia. Osteopenia is the first stage of demineralisation of bones and if not corrected in time can lead to osteoporosis. Demineralisation is the process wherein calcium from the bones starts reducing leading to brittle and fragile bones causing easy breakage.



In case of women, demineralisation occurs at faster rate after menopause i.e. after the age of 45. In studies among adults, one three-year study in healthy young women aged 30-42 years showed that enriching the diet with dairy foods prevented bone loss in the spine, compared with control subjects who did not increase their dietary calcium intake. So for women early measures to maintain bone health is very important aspect. [4]Like any organ in the body, the skeleton needs a balanced diet containing both macro nutrients(energy, protein, fat and carbohydrate) and micro nutrients (vitamins and minerals) for its normal development and maintenance. Calcium,Phosphorus along with other minerals like Vitamin D is essential to

[3] L. A. Milliken, J. Wilhelmy, C. J. Martin et al., "Depressive symptoms and changes in body weight exert independent and site-specific effects on bone in postmenopausal women exercising for 1 year," Journals of Gerontology A: Biological Sciences and Medical Sciences, vol. 61, no. 5, pp. 488–494, 2006. View at Google Scholar · View at Scopus

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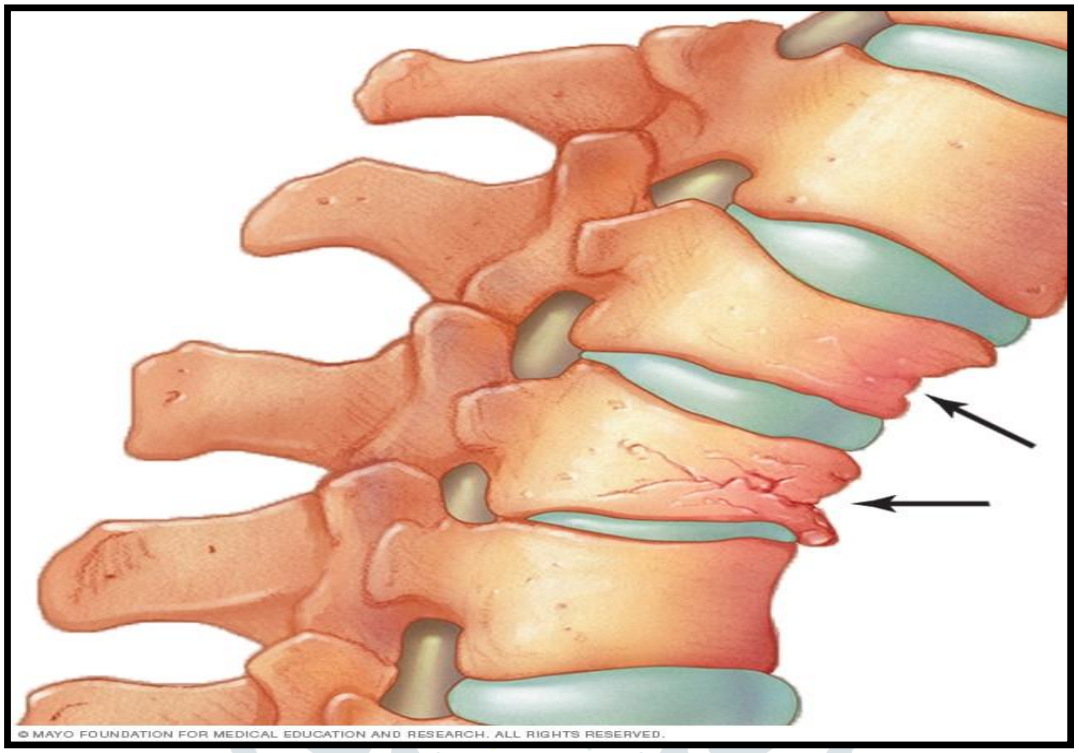
Complications



Compression fractures

Bone fractures, particularly in the spine or hip, are the most serious complication of osteoporosis. Hip fractures often are caused by a fall and can result in disability and even an increased risk of death within the first year after the injury.[6]

In some cases, spinal fractures can occur even if you haven't fallen. The bones that make up your spine (vertebrae) can weaken to the point that they may crumple, which can result in back pain, lost height and a hunched forward posture.[7]

[5] D. Feskanich, W. Willett, and G. Colditz, "Walking and leisure-time activity and risk of hip fracture in postmenopausal women," Journal of the American Medical Association, vol. 288, no. 18, pp. 2300–2306, 2002. View at Publisher · View at Google Scholar · View at Scopus

[6] A. G. Robling, A. B. Castillo, and C. H. Turner, "Biomechanical and molecular regulation of bone remodeling," Annual Review of Biomedical Engineering, vol. 8, pp. 455–498, 2006. View at Publisher · View at Google Scholar · View at Scopus

Hormone levels

Osteoporosis is more common in people who have too much or too little of certain hormones in their bodies. Examples include:

- **Sex hormones.** Lowered sex hormone levels tend to weaken bone. The reduction of estrogen levels in women at menopause is one of the strongest risk factors for developing osteoporosis. Men experience a gradual reduction in testosterone levels as they age. Treatments for prostate cancer that reduce testosterone levels in men and treatments for breast cancer that reduce estrogen levels in women are likely to accelerate bone loss.
- **Thyroid problems.** Too much thyroid hormone can cause bone loss. This can occur if your thyroid is overactive or if you take too much thyroid hormone medication to treat an underactive thyroid.
- **Other glands.** Osteoporosis has also been associated with overactive parathyroid and adrenal glands.[8]

Dietary factors

Osteoporosis is more likely to occur in people who have:

- **Low calcium intake.** A lifelong lack of calcium plays a role in the development of osteoporosis. Low calcium intake contributes to diminished bone density, early bone loss and an increased risk of fractures.
- **Eating disorders.** Severely restricting food intake and being underweight weakens bone in both men and women.
- **Gastrointestinal surgery.** Surgery to reduce the size of your stomach or to remove part of the intestine limits the amount of surface area available to absorb nutrients, including calcium.

Steroids And Other Medications

Long-term use of oral or injected corticosteroid medications, such as prednisone and cortisone, interferes with the bone-rebuilding process. Osteoporosis has also been associated with medications used to combat or prevent:

- Seizures

[7] J. Rittweger, H. M. Frost, H. Schiessl et al., “Muscle atrophy and bone loss after 90 days' bed rest and the effects of flywheel resistive exercise and pamidronate: results from the LTBR study,” Bone, vol. 36, no. 6, pp. 1019–1029, 2005. View at Publisher · View at Google Scholar · View at Scopus

[8] J. Rittweger, G. Beller, G. Armbrecht et al., “Prevention of bone loss during 56 days of strict bed rest by side-alternating resistive vibration exercise,” Bone, vol. 46, no. 1, pp. 137–147, 2010. View at Publisher · View at Google Scholar · View at Scopus

- Gastric reflux
- Cancer
- Transplant rejection

Medical conditions

The risk of osteoporosis is higher in people who have certain medical problems, including:

- Celiac disease
- Inflammatory bowel disease
- Kidney or liver disease
- Cancer
- Lupus
- Multiple myeloma
- Rheumatoid arthritis

Lifestyle choices

Some bad habits can increase your risk of osteoporosis. Examples include:

- **Sedentary lifestyle.** People who spend a lot of time sitting have a higher risk of osteoporosis than do those who are more active. Any weight-bearing exercise and activities that promote balance and good posture are beneficial for your bones, but walking, running, jumping, dancing and weightlifting seem particularly helpful.[9]
- **Excessive alcohol consumption.** Regular consumption of more than two alcoholic drinks a day increases your risk of osteoporosis.
- **Tobacco use.** The exact role tobacco plays in osteoporosis isn't clearly understood, but it has been shown that tobacco use contributes to weak bones.

Prevention

Good nutrition and regular exercise are essential for keeping your bones healthy throughout your life.[10]

[9] J. Rittweger, G. Beller, G. Armbrecht et al., "Prevention of bone loss during 56 days of strict bed rest by side-alternating resistive vibration exercise," Bone, vol. 46, no. 1, pp. 137–147, 2010. View at Publisher · View at Google Scholar · View at Scopus

[10] B. J. Kiratli, A. E. Smith, T. Nauenberg, C. F. Kallfelz, and I. Perkash, "Bone mineral and geometric changes through the femur with immobilization due to spinal cord injury," Journal of Rehabilitation Research and Development, vol. 37, no. 2, pp. 225–233, 2000. View at Google Scholar · View at Scopus

Protein

Protein is one of the building blocks of bone. And while most people get plenty of protein in their diets, some do not. Vegetarians and vegans can get enough protein in the diet if they intentionally seek suitable sources, such as soy, nuts, legumes, and dairy and eggs if allowed. Older adults may also eat less protein for various reasons. Protein supplementation is an option.[11]

Body weight

Being underweight increases the chance of bone loss and fractures. Excess weight is now known to increase the risk of fractures in your arm and wrist. As such, maintaining an appropriate body weight is good for bones just as it is for health in general.

Calcium

Men and women between the ages of 18 and 50 need 1,000 milligrams of calcium a day. This daily amount increases to 1,200 milligrams when women turn 50 and men turn 70. Good sources of calcium include:

- Low-fat dairy products
- Dark green leafy vegetables
- Canned salmon or sardines with bones
- Soy products, such as tofu
- Calcium-fortified cereals and orange juice

If you find it difficult to get enough calcium from your diet, consider taking calcium supplements. However, too much calcium has been linked to kidney stones. Although yet unclear, some experts suggest that too much calcium especially in supplements can increase the risk of heart disease. The Institute of Medicine

[11] E. M. Smith, C. M. Comiskey, and A. M. Carroll, "A study of bone mineral density in adults with disability," Archives of Physical Medicine and Rehabilitation, vol. 90, no. 7, pp. 1127–1135, 2009. View at Publisher · View at Google Scholar · View at Scopus

recommends that total calcium intake, from supplements and diet combined, should be no more than 2,000 milligrams daily for people older than 50.[12]

Vitamin D

Vitamin D improves your body's ability to absorb calcium and improves bone health in other ways. People can get adequate amounts of vitamin D from sunlight, but this may not be a good source if you live in a high latitude, if you're housebound, or if you regularly use sunscreen or avoid the sun entirely because of the risk of skin cancer.

Scientists don't yet know the optimal daily dose of vitamin D for each person. A good starting point for adults is 600 to 800 international units (IU) a day, through food or supplements. For people without other sources of vitamin D and especially with limited sun exposure, a supplement may be needed. Most multivitamin products contain between 600 and 800 IU of vitamin D. Up to 4,000 IU of vitamin D a day is safe for most people.[13]

Conclusion

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.[14]Combine strength training exercises with weight-bearing and balance exercises. Strength training helps strengthen muscles and bones in your arms and upper spine, and weight-bearing exercises — such as walking, jogging, running, stair climbing, skipping rope, skiing and impact-producing sports — affect mainly the bones in your legs, hips and lower spine. Balance exercises such as tai chi can reduce your risk of falling especially as you get older. Swimming, cycling and exercising

[12] P. Collet, D. Uebelhart, L. Vico et al., "Effects of 1—and 6-month spaceflight on bone mass and biochemistry in two humans," Bone, vol. 20, no. 6, pp. 547–551, 1997. View at Publisher · View at Google Scholar · View at Scopus
[13] L. Vico, P. Collet, A. Guignandon et al., "Effects of long-term microgravity exposure on cancellous and cortical weight-bearing bones of cosmonauts," The Lancet, vol. 355, no. 9215, pp. 1607–1611, 2000. View at Google Scholar · View at Scopus
[14] L. Raisz, J. Bilezikian, and T. Martin, "Pathophysiology of osteoporosis," in Principles of Bone Biology, vol. 2, pp. 1635–1647, Elsevier, 3rd edition, 2008. View at Google Scholar

on machines such as elliptical trainers can provide a good cardiovascular workout, but they're not as helpful for improving bone health.

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