

“Role of Finger Millet, Pearl Millet and Foxtail Millet in Osteoporosis.”**Dr. Rakhi G Nishane¹, Dr. Archana S. Dachewar²**

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ABSTRACT

Objectives- Osteoporosis is a chronic, metabolic, progressive bone disease which is characterized by decrease in bone density and increased bone fragility resulting in increase the risk of fracture. It is the most common bone disease affecting one in three women and one in five men over the age of 50 years Worldwide. The study is aimed to decrease such conditions using dietary suppliments like Finger millet and Pearl millet. **Methodology-** This review study is carried out using scientific material related to millets used in osteoporosis, *Asthikshaya*. *Ayurveda* literature, journals, research papers, online database regarding Millets, osteoporosis and other relevant topics are reviewed for the study.

Result- To prevent osteoporosis and osteopenia, calcium and vitamin D suppliments are required. Dietary based calcium and vitamin D suppliments are easier to practice. Finger millet (ragi, Eleusine coracana), Pearl millet (bajra, pennisetum glaucum) and Foxtail millet (kangani, Setaria italica) are rich source of calcium, vitamin D, phosphorous, vitamin B12 etc. and also they are easily digestible.

Madhur, tikta, kashaya rasa, ushna virya, madhur vipak of ragi, bajra and kangani are also mentioned in ayurvedic text which helps in balancing vata dosha which is helpful in asthikshaya. **Conclusion-** Osteoporosis and osteoporotic fractures leads to significant decrease in quality of life with increased morbidity, mortality and disability in individual. Finger millets, pearl millet and foxtail millet contributes to high calcium retention and high bioavailblity of calcium and could be useful for healthy bone growth and decrease depletion of bone tissue i.e. asthikshay.

KEYWORDS: Millets, Osteoporosis, Finger millet, Pearl millet, Foxtail millet
Asthikshay, Osteopenia

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INTRODUCTION

Osteoporosis is a chronic, metabolic, progressive bone disease which is characterized by decrease in bone density and increased bone fragility resulting in increase the risk of fracture due to deterioration of bone tissue and disruption of bone architecture, compromised bone strength. It is the most common bone disease, Worldwide over 200 million people have osteoporosis affecting one in three women and one in five men over the age of 50 years. Approximately 9 million fracture occur per year as a result of osteoporosis. Population based studies in India show prevalence of osteoporosis in male as 3% and female as 8% according to ICMR report¹. It means women have higher chances of developing osteoporosis. There is a higher risk of Osteoporosis in financially and educationally lower class due to insufficient nutrition.

osteoporosis is a “silent disease”, because there are no symptoms prior to a fracture. However, once a person has broken a bone, their risk of breaking another fragility fracture increases. It is becoming an urgent and serious global epidemic. Early diagnosis and treatment are essential to reduce morbidity and mortality associated with it. In Ayurveda, the depletion of the bone tissue is called Asthikshaya. This is due to nutrient deficiency because of malnutrition and imbalance of Vata dosha^{2,3}.

Instead of taking pharmaceutical drugs food supplemented with required nutrients (calcium and vitamin D3) could help to overcome osteoporosis. Millets like sorghum (Jowar), pearl millet (Bajra), finger millet (Ragi), foxtail millet (Kakum), proso millet (Chenak), little millet (Kutki), kodo millet (Kodon), barnyard millet (Sanwa), and brown top millet. Ragi or finger millet can be used. Finger millet is richest source of calcium and phosphorus⁴. Pearl millet is second rich source of calcium also rich in vitamin D also Foxtail millet contains copious calcium.

AIM AND OBJECTIVE:

This study is aimed to decrease conditions like osteoporosis and related complications like osteoporotic fractures using dietary supplements like Finger millet, Pearl millet and Foxtail millet.

To promote nutritional diet i.e. Millets to maintain healthy life, healthy ageing and prevent early onset of metabolic diseases.

To provide best nutritional food at affordable price in the form of millets. So that each individual of society including financially weaker group can get quality nutrition in affordable price.

MATERIAL AND METHODS:

Millets are minor cereals of the grass. They are small seeded, annual cereal grasses, many of which are adapted to tropical and arid climates and are characterized by their ability to

survive in less fertile soil.

1) Finger millet^{5,6}:

It is also known as Madua, Nachni, Rollu or Sattemaw. It is referred as "poor people's crop" as it provides high quality nutrition at a low price.

Properties of Finger millet:

Rasa	Tikta, Madhur, Kashaya
Veerya	Ushna
Vipak	Madhur
Guna	Ruksha, Laghu
Action on doshas	Vatakar, kapha-pittahar
Parts used	Seed

Therapeutic Value of finger millet:

Ragi is rich in calcium which helps in strengthening bones. It is an excellent source of natural calcium for growing children. It is thirty times more nutritious than that of rice and wheat. Ragi consumption helps in development of bones in growing children and maintenance of bone health in adults. Also, it has good amounts of thiamine, riboflavin, iron, methionine, isoleucine, leucine, phenylalanine and other essential amino acids. The abundance of these phytochemicals enhances the nutraceutical potential of finger millet, making it a powerhouse of health benefitting nutrients. It has distinguished health beneficial properties, such as antioxidant, antibacterial, anti-diabetic (type 2 diabetes mellitus), atherosclerogenic, and antimicrobial properties. Finger millet provides high calcium bioavailability, and contributes to higher calcium retention due to its calcium content compared to other staples and reduced bone resorption, hence can exert beneficial effects especially for children, the elderly, and women.

100 grams of finger millet contains:

Protein	7.3gm
Carbohydrates	72gm
Fat	1.30gm
Fiber	11.50gm
Calcium	344mg
Phosphorus	283mg
Iron	3.9mg
Magnesium	137mg
Sodium	11mg
Zinc	2.7mg
Energy	328 Kcal

2) Pearl millet⁷:

Pearl Millet (*Cenchrus americanus*) or Bajra, perhaps the most famous and widely available one among the lot. It is also popularly known as African Millet or Spiked Millet in various parts of the world.

Properties of pearl millet:

Rasa	Madhur, Kashaya
Veerya	Ushna
Vipak	Madhur
Guna	Ruksha, Laghu
Action on doshas	Vatakar, kapha-pittahar
Parts used	Seed

Therapeutic Value of pearl millet:

This phosphorous rich millet along with calcium, strengthens bones, prevents joint pains and also averts the risk of chronic conditions like osteoporosis. Individuals above 30 years experiencing joint pains should get Bajra on to your diet list. The niacin content in pearl millet is higher than all other cereals. It also contains folicate, magnesium, iron, copper, zinc, and vitamins E and B-complex. It has high energy content compared to other millets.

100 grams of pearl millet contains

Protein	11gm
Carbohydrates	72gm
Fat	4.2gm
Fiber	8.50gm
Calcium	42mg
Phosphorus	285mg
Iron	3.9mg
Magnesium	11mg
Sodium	5mg
Zinc	1.9mg
Energy	361 Kcal

Foxtail Millet⁸:

It is also known as Kangani (*Setaria italica*). Foxtail millet is the most grown species of millet in Asia. It is the richest source of iron, calcium and phosphorus which plays important role in maintaining healthy bones and muscles. It is also rich in vitamin B12, protein and fibres.

Properties of Foxtail Millet:

Rasa	Madhur,Kashaya
Veerya	Ushna
Vipak	Madhur
Guna	Ruksha
Action on doshas	Vatakar, kapha-pittahar
Parts used	Seed

Therapeutic Value of Foxtail Millet:

Foxtail millet is the power house of nutrition. It contains excellent amount of calcium and iron in addition to lysine, iron, thiamine, vitamin B12 etc. kangani helps to prevent osteoporosis, arthritis, bone inflammatory conditions.

100 grams of foxtail millet contains

Protein	12.3gm
Carbohydrates	60.9gm
Fat	4.3gm
Fiber	8gm
Calcium	31mg
Phosphorus	290mg
Iron	2.8mg
Magnesium	8.1mg
Sodium	4.6mg
Zinc	2.4mg
Energy	331 Kcal

RESULT AND DISCUSSION

Now it is an established fact that the whole world is facing many health challenges because of fiberless foods. It is also clear to patients that all the lifestyle diseases can be made to disappear just by eating millets and removing refined foods. To prevent the risk of developing osteoporosis one should eat a well-balanced diet. There is an increasing trend in research, focusing on the application of alternative grains such as ragi (finger millet) and bajra (pearl millet) which are potentially healthy to prevent the calcium deficiency among individuals. Pearl millet, Finger millet and Foxtail millet being a low cost millet with higher dietary fiber contents, several micronutrients and phytonutrients with practically no reports of any adverse effect, deserves attention.

The few available studies show that finger millet provides high calcium bioavailability and contributes to higher calcium retention due to its calcium content compared to other staples

and reduced bone resorption, hence can exert beneficial effects especially for children, the elderly, and women.

Polyphenols of pearl millet grains may contribute to the prevention, management and treatment of some bone pathogenesis by their positive impact on osteoimmunology revealed by their immunomodulatory effects. The high levels of nutrition ,calcium, phosphorus, several micronutrients, polynutrients in finger millet, pearl millet and their positive results in the existing studies hold a promise for health benefits associated with pearl millet, finger millet, foxtail millet integration into more diets and programs.

Foxtail millet is a farmer friendly and a very healthy crop. It is a good source of calcium, phosphorus, vitamin B12 and iron which is helpful in healthy bone formation thus it reduces the risk of osteoporosis and osteoporotic fracture. Despite of having bone health benefits it also contributes to digestive well being, heart health and weight management.

CONCLUSION

Food containing high calcium, potassium, magnesium with vitamins and other minerals, phosphorus, iron, and zinc are preferable for the normal bone metabolism to control osteopenia and osteoporosis. It helps in strengthening bones and also helps to balance Vata. This reduces the risk of Osteoporosis. Various studies have shown that consumption of nutraceutical foods like Finger millet Pearl millet and foxtail millet may provide greater health benefits.

Osteoporosis and osteoporotic fractures leads to significant decrease in quality of life with increased morbidity, mortality and disability in individual. Finger millets, pearl millet and foxtail millet contribute to high calcium retention and high bioavailability of calcium and could be useful for healthy bone growth and decrease depletion of bone tissue i.e. asthikshay.

Most of the civilized people have not even heard about millets and much less understand the benefits of millet nutrition therefore such studies will promote the use of millets. As modern medicine contain inorganic calcium compounds such as calcium carbonate, calcium citrate etc which may be of modest bioavailability and can have undesirable effects such as kidney stone formation, constipation, etc. High levels of calcium in finger millet and several polynutrients in pearl millet the improves condition like osteopenia, osteoporosis etc.

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