

## Folk Medicine in Treatment of Osteoporosis

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### Abstract

Osteoporosis has become a major health problem, affecting a huge population worldwide. The ideology of “back to nature” is thought to be safer and of comparable efficacy for the treatment of osteoporosis compared to hormonal therapy. In this review, famous medicinal plants and phytoconstituents used in osteoporosis are revised.

**Keywords:** Medicinal Plants; Osteoporosis; Phytoestrogen; Flavonoids

### Introduction

Osteoporosis is a chronic disease in which the skeleton loses a weighty proportion of its mineralized mass and mechanical pliability [1]. It occurs when bone resorption surpasses bone formation, causing an imbalance [2]. As a result; bones tend to become more fragile and more susceptible to fractures [3]. Usually it is associated with estrogen hormone deficiency during the menopause. A sharp decrease in the sex hormone level is predominant cause of fast hormone-related bone demineralization during the menopause [4]. Estrogen deficiency disturbers the balance between bone formation and bone resorption resulting in a net bone loss [5]. Studies have shown that 50% of women and 20% of men are likely to have a fracture resulting from osteoporosis during their lifetime [6]. Such fractures impose a heavy health and economic burden worldwide [7, 8]. The risk of developing osteoporosis has been shown to be directly linked to diet. Studies have reported that people eating healthy diets with a high fruit and vegetable contents tend to have lower bone resorption than their counterparts eating poor diets rich in processed foods [9] Pharmacological management of osteoporosis involves the use of bisphosphonates and estrogen replacement therapy. However, these medicines suffer adverse effects that may range from gastric irritation to increased thromboembolic and cancer risks [10]. Therefore, it is imperative that we look for safer and effective alternatives. In this regard, medicinal herbs and plant-derived molecules have gained wide acceptance by the public and scientific communities [11].

### Important phytoconstituents in Osteoporosis

Some plant constituents as well as medicinal plants are used traditionally to overcome osteoporosis [12-14]. Flavonoids, which are widely found in fruit and vegetables, are bioactive polyphenols with anti-inflammatory and antioxidant properties. Bone health has been associated with the intake of flavonoids. Flavonoids rich diet increases bone mass density (BMD) in the neck and spine, and decreases bone resorption in peri-menopausal women [15]but little is known about their role in bone health in humans. Meanwhile, catechins and flavanones were found to associate with markers of bone resorption negatively. At the hip and spine, anthocyanins were found to be

strongly linked with bone mass density [16]. It has been postulated that the reduction of low-grade inflammation and oxidative stress by flavonoids is the hallmark of protecting bone loss. In addition, flavonoids are thought to promote the upregulation of signaling pathways that increase the activity of osteoblasts [17]. Moreover, many flavonoids proved an increase in bone formation in osteoporosis like icariin, naringin, ugonin K, genistein, quercetin and rutin [18].

Phytoestrogens are other plant constituents that could be used in management of osteoporosis. They are plant-derived compounds structurally/functionally simulate mammalian estrogens, and play an important role in the management of malignancy, menopausal symptoms, heart disease, and osteoporosis. Phytoestrogens can be classified into steroidal estrogens and phenolic estrogens such as iso-flavones, coumestans, and lignans [19]. Other classes of phytoestrogens might include: anthraquinones [20], chalcones [21], flavones [22], prenylated flavonoids [23], naphthalenes, naphthopyrones, and sesquiterpenoidal naphthoquinones [24, 25]. Phytoestrogens possess a selective estrogen receptor modulators (SERMs) -like manner [26, 27]. Numerous plants and food sources are rich in phytoestrogens like, soybeans, flaxseeds, and certain other fruits and vegetables.

### Popular examples in Folk medicine

In folk medicine many plants are used for this purpose. Ethanol extract of *Cissus quadrangularis* (Vitaceae) (commonly known as Had-jod), has a definite antiosteoporotic effect due to its high calcium content and osteoclastic inhibition [28].

Extracts of *Cimicifuga racemosa* (Ranunculaceae) (commonly known as black cohosh), exhibit protective effects on estrogen deficiency induced bone loss. Its effect was attributed to osteoclastic inhibition through binding of their active constituents to estrogen receptors [29].

The soybean (*Glycine max*) (Fabaceae), is a species of legume native to East Asia. Studies of soy in targeted populations, such as post-menopausal Chinese women with lower bone mass, have shown a greater effect on increasing bone mineral content for women consuming a high dose of soy extract as compared to placebo [27] the effect of soybean was attributed to its isoflavonoid contents.

*Trifolium pratense* (Fabaceae) (commonly known as red clover) is a species of clover native to Europe, western Asia and northwest Africa, but planted and naturalized in many temperate areas including the Americas and Australia. Total isoflavones isolated from *T. pratense* were effective in reducing bone loss induced by ovariectomy, probably by reduction of the bone turnover via inhibition of bone resorption [30].

*Camellia sinensis*, (Theaceae) whose leaves and leaf buds are used to produce tea. The major constituents in tea are polyphenols and flavonoids. The four major flavonoids in green tea are the catechins i.e. epicatechin (EC), epigallocatechin (EGC), epicatechin gallate (ECG), and epigallocatechin gallate (EGCG). Phytoestrogenic effect of the aqueous extract of *C. sinensis* on the ovariectomized rat model was referred to elevation of serum estradiol level [31].

*Lepidium sativum* seeds (Brassicaceae) (commonly known Garden cress, Hab al Rachad) is commonly used in bone fracture in the Arabic region. The seed is rich in imidazole alkaloids, saponins, flavonoids, carbohydrates, amino acids and thioglycosides [32]. Previous studies showed that feeding seeds to glucocorticoid-induced osteoporosis rats resulted in enhancement of serum calcium, bone architecture, bone-specific alkaline phosphatase and decreased tartrate-resistant acid phosphatase [33, 34].

Shilajit (mumian, mumie) is also another product used in Arabian region for its treatment of bone fracture. It is a brown exudate obtained from rocky layers in many mountains in the world like Himalaya [35]. It also found in different countries as Norway, Russia, and Tibet. It may be formed for centuries by the gradual decomposition of certain plants by the action of microorganism [36]. Chemically it is formed from humic substances (results of degradation of organic matter, mainly vegetal substances by micro-organism) including fulvic

acid (60%-80%), humic acids and humins. Fulvic acid has memory enhancer effect in Alzheimer's disease, anti-oxidant, anti-aging and anti-inflammatory activities. Recently, it was reported that mumie extract in low concentrations increases proliferation rate and decreases mortality rate of MG63 human osteoblast-like cells, meanwhile higher concentration could be toxic and ineffective [37].

### Conclusion

Osteoporosis is one of chronic diseases that affect millions of people worldwide. Classical treatment by conventional drugs like Hormonal replacement therapy, bisphosphonates, and calcitonin convey a wide range of side effects. Medicinal plants and their phytoconstituents may represent safer way for management of this chronic illness.

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