

**INTERNATIONAL JOURNAL OF ADVANCES IN PHARMACY,
BIOLOGY AND CHEMISTRY****Review Article****Medicinal Plants in Osteoporosis- A Review****PL. Rajagopal^{1*}, C. Amrutha¹, K. Premaletha² and N. Premkumar³**

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ABSTRACT

Osteoporosis is a disease of bones that leads to an increased risk of fracture. In osteoporosis, the bone mineral density is reduced and the amount and variety of proteins in bone are altered. The form of osteoporosis most common in women after menopause is referred to as primary type 1 or postmenopausal osteoporosis. Primary type 2 osteoporosis occurs after age 75 and is seen in both females and males at a ratio of 2:1. Several herbs can be used for preventing and treating osteoporosis may be because of the presence of certain specialised phytoconstituents in them.

Keywords: Osteoporosis, Herbs, Phytoconstituents.

INTRODUCTION

According to World Health Organization (WHO) Osteoporosis is defined by the as a bone mineral density of 2.5 standard deviation or more below the mean peak bone mass. The risk of osteoporosis fractures can be reduced with lifestyle changes and in those with previous osteoporosis related fractures medications.

Different types of medicinal plants approaches osteoporosis in different manner means some provide dietary calcium, some regulate the body's use of calcium, and some increase the level of certain hormones in the body. In this review an attempt has been made out to compile the medicinal plants which are commonly utilised in osteoporosis with their prominent chemical ingredients and certain pharmacological actions.

Astragalus membranaceus

Astragalus from leguminosae family is a perennial plant. It is native to the northern and eastern parts of China as well as Korea. The root is the medicinal part of the plant, and is usually harvested from 4-year-old plants. *Astragalus* root is believed to protect the body from environmental influences like cold, hot, warm and cool. It contain polysaccharides, saponins, flavonoids, amino acids, and trace elements.

Commiphora Mukul

Commiphora mukuli (Guggal from Bursaraceae family) is a flowering plant. The guggul plant may be found from northern Africa to central Asia and in northern India. It is a shrub or small tree. The resin collected from the plant has got many medicinal properties. The major chemical constituents of Guggul resin include phytosterols, gugalipids, and guggulsterones. It was traditionally combined with other herbs for the treatment of arthritis, skin diseases, pains in the nervous system, obesity, digestive problems, infections in the mouth, and menstrual problems. The composition of the resin are Guggulosterone-Z, Guggulosterone, Guggulosterone I – VI. Sesanin, camphorene and cambrane.

Cornus officinalis

The plant from cornaceae family is a native to China and Japan. The plant usually grows as a large, spreading, multi-stemmed, deciduous shrub. The fruits are utilised as a source of drug. It is used as an antibacterial, antifungal and astringent drug. The fruit contain oleanolic acid and ursolic acid.

Dioscorea batatas

The plant from dioscoreacea family is a vigorous twining herbaceous climber. The tuber is

anthelmintic, digestive and gently tonic. It is used internally in the treatment of tiredness, weight loss, poor appetite, poor digestion, chronic diarrhoea, asthma, dry coughs, frequent or uncontrollable urination, diabetes and emotional instability¹. It is applied externally to ulcers, boils and abscesses. The tubers are harvested in the autumn. It contains steroidal glycosides.

Drynaria baronii

Drynaria fortunei plant is an epiphytic herb from polypodiaceae family. The rhizomes are used as a source of drug. *Drynaria* is primarily used for its ability to heal damaged bones and connective tissues. It is used to help heal broken bones, sprains, bruises, stress fractures, weak loins and knees, and it is also used as a tonic for recuperation from other injuries. *Drynaria* is used in treatments for tooth-related maladies, such as toothache and bleeding gums, as well as for tinnitus of the ears. Its focus on the kidney and liver channels inspires its use in tonifying the kidneys, curbing diarrhea, and promoting tissue regeneration. It is used as a hair vitaliser. It contains a chemical constituent called propinqualin.

Epimedium leptorrhizum

Epimediums (Beriberidaceae) have been popular in Japan. The stem of this plant is used in treating Osteoporosis. The major constituent present in the stem is icariin which stimulates osteoblast activity in bone tissue, leading to the development and marketing of medicinal products based on *epimedium* extracts for treatment of osteoporosis. In addition to icariin it also contains diphylloside, epimedeside, epimedin, epimedeside and icarisoside.

Glycine max

The plant is from fabaceae family and generally seeds of the plant are used as source of medicine. The fruit is a hairy pod that grows in clusters of three to five, each pod is 3–8 cm long (1–3 in) and usually contains two to four seeds 5–11 mm in diameter. If the seed coat is cracked, the seed will germinate. The scar, visible on the seed coat, is called the hilum and at one end of the hilum is the micropyle, or small opening in the seed coat which can allow the absorption of water for sprouting. Seeds are a powerful stimulant of immune system, used to decrease menopause symptoms, estrogen, lower cholesterol, treat certain types of cancers including that of the breast, lungs, prostate. It is also used for treating inflammations, eye-infections, blood clotting, insomnia, fevers, liver and kidney disorders, oligospermia, leukemia, stomachaches, intestinal complaints and cardiovascular diseases. Seeds contain chemical constituent like Isoflavones, Saponins and lipids.

Glycyrrhiza glabra

The plant belongs to leguminosae family and the root portion collected from the plant is considered as a source of drug. The root has an anti-inflammatory and antiviral actions. Saponin glycosides and glycyrrhizin are the important chemical ingredients present in the drug which are required for good health. It is mainly used in treating cervical cancer, kidney and bladder disorders, HIV, coughs, horse-voice, bronchitis, asthma, ulcers, arthritis, shingles, sun-burns, fevers in infants, and also used for insect bites. In addition to glycyrrhizin the root also contains mixture of potassium and calcium salts of glycyrrhizic acid, glabranin A and B, glycyrrhetol, glabrolide, isoflavones, coumarins, triterpene sterols.

Lycium chinense

The plant is from solanaceae family. Generally the fruit portion of the plant is used as a source of drug. The plant is deciduous and perennial plants. These species produce a bright orange-red, ellipsoid berry 1–2-cm deep. The number of seeds in each berry varies widely based on fruit size. *Lycium* is used for diabetes, high blood pressure, poor circulation, fever, malaria, and cancer. It contains essential oil.

Nigella sativa

The plant is from Ranunculaceae family. It is also known as black cumin or habatus sauda, and has a rich historical and religious background. It is found in the southern region of Asia. Studies have revealed various therapeutic values of the plant such as anticancer, antioxidant, antibacterial, antifungal, antiparasitic and antiasthmatic. The plant may also inhibit renal calculi and improve poultry quality. It contains 36–38% fixed oils, proteins, alkaloids, saponin, and 0.4–2.5% essential oil. High-performance liquid chromatography analysis of the essential oil from the plant revealed that the main active ingredients were thymoquinone, dithymoquinone, thymohydroquinone, and thymol. Among the compounds identified, thymoquinone is the most abundant, which makes up 30–48% of the total compounds.

Notopterygium forbesii

The plant is considered as an annual or perennial. The plant belongs to Umbelliferae family. It has been used as a traditional Chinese medicine for the treatment of common cold and rheumatism. It contains different types of chemical constituents like phellopterin, isoimperatorin, notopteron, nodakenitin, nodakenin, 6-O-trans-feruoylnodakenin, p-hydroxyphenethyl anisate, pregnenolone and beta-sitosteroid.

Podophyllum emodi

The perennial herb *Podophyllum hexandrum* (Berberidaceae), bearing the common names Himalayan mayapple or Indian may apple, is native to the Himalaya. The ornamental appearance of the plant make it a desirable addition to woodland type gardens. It can be propagated by seed or by dividing the rhizome. The plant is poisonous, but when processed has medicinal properties. The root portion of the plant is considered as a source of drug. Eventhough *Podophyllum* is highly poisonous when taken by mouth some people take it orally for jaundice and also in certain types of liver ailments. *Podophyllum* is also used to empty the bowels, kill parasitic worms in the intestine, and counteract snakebite. *Podophyllum* has been used as a laxative. But presently it has been removed from the market due to safety concerns. It is also topically applied for removal of warts.

Panax ginseng

Panax ginseng belongs to the Araliaceae family and is found throughout East Asia and Russia. It is a shade-loving plant, deciduous and perennial herb. The root is utilized medicinally, although active compounds are present in all other parts of the plant. There are two types of Ginseng, like white and red. The difference is the method of processing that results in different pigment compositions; white ginseng is produced by harvesting the root and drying it in the sun, while red ginseng is steamed after harvest and dried. The content of ginsenoside compounds differs slightly between the red and white forms. The use of Ginseng builds body's resistance to infections, reduces susceptibility to illness and shortens the time that the disease would take to recover, improves intelligence, mental performance, immune function, increases stamina, combats fatigue, premature aging, lowers blood sugar and helps in treating cancer. The ginsenoside present in the drug may beresponsiblefor the abovesaid properties.

Psoralea corylifolia

The plant belongs to leguminosae family. The oil obtained from the seeds have got many medicinal properties. It is a small, erect, annual herb growing throughout sandy, loamy plains of Central and East India. Seeds are brownish black in color, oblong, and flattened. Seeds are considered aphrodisiac, cardiac, diuretic, diaphoretic, stomachic, astringent, tonic, cytotoxic, anthelmintic, antibacterial, deobstruent, and stimulant. They are used to improve general vitality and also to treat impotency. The chemical constituent present in the drug are flavonoids, psoralidin, psoralen and angelicin.

Punica granatum

The berry type *Punica granatum* (Punicaceae) fruit is edible. Fruits and seeds are the having many medicinal properties. The exact number of seeds in a pomegranate can vary. The seeds are embedded in a white, spongy, astringent membrane. It has immuno-stimulatory, anti-oxidant, anti-inflammatory anti-diabetic and anticancer. It is widely used in treating certain types of cancer including leukemia, breast, prostate and colon cancer, dysentery, diarrhea, excessive bleeding, intestinal worms and parasites. It contain chemical constituents like anthocyanins, tannins and phenolic compounds.

Sambucus nigra

It is a deciduous shrub belongs to Caprifoliaceae family. The hermaphrodite flowers are borne in large, flat corymbs 10–25 cm diameter in late spring to mid-summer, the individual flowers ivory white, 5–6 mm diameter, with five petals; they are pollinated by flies. The fruit is a glossy dark purple to black berry 3–5 mm diameter, produced in drooping clusters in late autumn they are an important food for many fruit-eating birds, notably blackcaps. *Sambucus nigra* possesses immuno-stimulant, astringent, antiviral, anti-inflammatory, anticancer properties and essential oils, flavonoids, organic acids, triterpenes and many other constituents. The flowers and berries are used in treating colic, diarrhea, fever, coughs, colds, congestion, bronchitis, influenza, allergies, rheumatism, swollen limbs, burns, inflamed mucous membranes, and act as an immuno-stimulant, anticancer and anti-inflammatory agent. It contain Volatile oil α -amyrenone, α -amyrin, betulin, oleanolic acid and beta-sitosterol.

Sambucus williamsii

Sambucus is from Caprifoliaceae family. The genus occurs in temperate to subtropical regions of the world. More widespread in the Northern Hemisphere, its Southern Hemisphere occurrence is restricted to parts of Australasia and South America. Many species are widely cultivated for their ornamental leaves, flowers and fruit. Aerial portion of the plant has got many medicinal actions. They are used in treating flu, alleviating allergies, and boosting overall respiratory heal. The drug mainly contain a chemical constituent called lignans.

Terminalia arjuna

Arjuna (Combretaceae) is the large size deciduous tree. It is the evergreen tree with the yellow flowers and conical leaves. It has a smooth gray bark. Arjuna flowers between March to June and fruits between September to November. Bark portion is used as a source of drug. It eliminates of cholesterol by accelerating the turnover of LDL-

cholesterol in the liver. It is also used as a cardiac stimulant. The bark contains tannins, triterpenoid saponins, flavonoids, gallic acid, ellagic acid and phytosterols.

Withania somnifera

Ashwagandha (Solanaceae) is an erect branched under shrub. Roots are used in the treatment of various diseases. They are fleshy, tapering, whitish brown, straight, unbranched, thickness varying with age. Its roots bear fibre like secondary roots. Ashwagandha is an excellent rejuvenator, a general health tonic and a cure for a number of health complaints. It is a sedative, diuretic, anti-inflammatory and generally respected for increasing energy, endurance, and acts as an adaptogen that exerts a strong immunostimulatory and an anti-stress agent. Ashwagandha is taken for treating cold and coughs, ulcers, emaciation, diabetes, conjunctivitis, epilepsy, insomnia, senile dementia, leprosy, Parkinson's disease, nervous disorders, rheumatism, arthritis, intestinal infections. Withaferin, withanolides, withanone and withasomidienone are the major ingredients in the root.

Zingiber officinale

Ginger is a medicinal plant that has been widely used in Chinese, Ayurvedic and Unani herbal medicines all over the world, since antiquity, for a wide array of unrelated ailments. The rhizomes of the plant are commonly utilised. Ginger has a distinctive thickened, branched rhizome. The rhizome has a brown corky outer layer and a peculiar odour. The drug is mainly used in treating sprains, muscular aches, pains, sore throats, cramps, constipation, indigestion, vomiting, hypertension, dementia, fever, infectious diseases and helminthiasis. The major chemical constituent present is an essential oil called gingerols.

Osteoporosis is a progressive disease characterized by the decrease in bone mass which has major

consequences for the patient. Considering there is no effective means to make up for the lost bone, the main strategy at present is prevention. Most of the above discussed plants are not studied yet in the treatment of osteoporosis, and hence there is a potential to reach a stage in the future when osteoporosis will no longer be a threat. The natural products are having encouraging effects on bone metabolism, structure, and strength, as well as in improving the rate of osteoporotic fracture healing. However, further studies are needed to confirm these effects as well as to elucidate the precise mechanisms of action.

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