



Review Article

Therapeutic Effect of *Moringa oleifera*

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ABSTRACT

Moringa oleifera, a highly valued plant produced globally and utilized in several food compositions, has medical and industrial purposes. This plant is gaining popularity due to its nutrient-rich leaves, pods, seeds, and flowers. *Moringa oleifera*, such as a miracle tree, has many health benefits, and it is a rich source of specific essential nutritional components and various health benefits. The oil from seeds was extracted and used for skin lotion and perfume. The most widely studied part of the Moringa plant is Moringa leaves and has many benefits related to health in various chronic conditions like liver diseases, hypertension, diabetes, cancer, hypercholesterolemia, insulin resistance, and inflammation. Moringa leaves extract can also be used to treat diabetes, cardiovascular disease, and malnutrition, while Moringa seeds can be utilized to enhance water quality. Moringa is a source of nutrition due to various essential phytochemicals, which are present in its leaves, pods, and seeds. It can be used for many nutritional as well as for commercial purposes. Moringa has many nutrients which have significant health benefits for the maintenance of the body. The seed powder of Moringa can be used to purify dirty water modestly and rapidly, and it possesses many health benefits.

INTRODUCTION

Moringa oleifera, native to the Indian subcontinent, grows very fast and is tolerant of drought from the Moringaceae group. Familiar names of this plant are Moringa, horseradish tree (which resembles horseradish), drumstick tree (from the long, slender, triangular seed-pods), and ben oil tree or benzolive tree and commonly fertilized as a vegetable and for traditional herbal medicine due to its young seeds, leaves, and pods. *Moringa oleifera* is one of the popular plants, extremely rich in vital nutrients and phytochemicals [1]. Interestingly, each portion of the *M. oleifera* plants are edible, including seed, pod leaf, root, flower, and bark, and produce nutrients that are essential for human beings and animals' well-being [2]. Moringa is said that contains 7 times greater amount of vitamin C as compared to oranges, 25 times greater amount of iron in comparison to spinach, 15 times greater amount of potassium in contrast to bananas, 10 times greater amount of vitamin A as compared to carrots, 17 times greater amount of calcium as compared to

milk, and 9 times greater amount of protein as compared to yogurt. Because of its impressive healing skills in different chronic diseases, it is popular among the commoners and is known as the 'Tree of Miracle.' Moringa was the most requested plant, "the most nutrient-rich plant yet discovered" [3].

Phytochemicals in Moringa: Moringa contains many beneficial phytochemicals, such as phenolic acids. Moringa oleifera seeds, buds, leaves, stems, and pods. Phytochemicals, chemicals produced by plants, are in the harshest sense of the word. It often has benefits in enhancing aroma, taste, colors, and shade of the plant and the health and texture, but humans, like essential nutrients, are not energetics. This family of plants is useful in rhamnose, a simple sugar, maltose compounds, rich in glucosinolates and isothiocyanates; a survey on Moringa species phytochemicals to investigate a variety of remarkable substances, to check analysis and reports

accordingly[4].

Therapeutic Properties of Moringa

Hypotension Effects: Its leaves contain many bioactive components, including mustard oil, nitrile, glycosides, and thiocarbamate glycosides, which are used for the stabilization of blood pressure. The four pure components, which are removed from ethanol extract present in MO leaves, niazinin B, niazinin A, niazimicin, and niazinin A Plus B, exhibited a blood pressure with fewer effects in rats, likely mediated by the antagonist effect of calcium. A recent study reported that in spontaneously hypertensive rats' MO reduced vascular oxidation[5].

Anti-Cancer Effects: Due to its chemopreventive properties, MO has been researched and has been seen to inhibit many human cancer cells growth. Several studies have documented the ability of Moringa leaves to secure organisms and their cells from oxidative DNA damage linked with cancer and many other diseases that cannot be treated. Khalafalla M. et al. found that the extract of Moringa leaves inhibited the viability of acute myeloid leukemia, acute lymphoblastic leukemia, and hepatocellular carcinoma cells. Several bioactive components are present in this plant that can be the reason for its anti-cancer properties. Its leaf extract has also been manifested to be efficient in the breast and pancreatic cancer cells[6].

Anti-Asthmatic Activity: The alkaloid of the Moringa plant is very similar to ephedrine's structure and action and can be used for the treatment of asthma. The alkaloid Moringine mediates bronchiolar motions. Seed kernel extract is found to be very effective for curing asthma of bronchioles. Moringa has played a dominant part in reducing the severity of asthma symptoms and improving respiratory functions [7].

Hypolipidemic Effects: Lipid homeostasis can be affected by many bioactive compounds present in the leaves of this plant. In lipid control, phenolic components and flavonoids have a significant role. They are involved in inhibiting cholesterol esterase activity in the pancreas and decreasing and slowing the absorption of cholesterol by converting it into insoluble complexes, binding bile acids, and elevating the fecal discharge, thus reducing plasma cholesterol concentration. MO extracts have demonstrated hypolipidemic activity due to lipase and cholesterol esterase inhibition by demonstrating their potential for hyperlipidemia avoidance and care. This tree has a strong influence on the profile of lipids by the outcomes of cholesterol reduction[8].

Anti-diabetic Effect: In glucose homeostasis, several compounds found in Moringa oleifera leaves may be committed. Isothiocyanates, for instance, have been announced to decrease both resistance of insulin and gluconeogenesis associated with the liver. Glucose

homeostasis is influenced by phenolic acids and flavonoids, affecting beta-cell mass, functioning, and increasing insulin sensitivity in the peripheral tissues. Flavonoids, tannins, and phenolic compounds also inhibit intestinal sucrose and pancreatic alpha-amylase activities to some degree. MO leaves have effective practices seen in various mechanisms on the metabolism of carbohydrates such as glucose intake, utilization, enhancing insulin activity, functioning of beta cells, etc. Its leaves have a role in hypo and hyperglycemia and can be because of the involvement of terpenoids required in the beta cells stimulation and consecutive insulin secretion. It has also been shown that flavonoids play a significant role in hypoglycemic action[9].

Antifertility Activity: There is an essential antifertility role of this plant. Post-coital antifertility effects in rats were demonstrated by the aqueous extract of the bark and root of the plant, and its fetal resorption was also encouraged in late pregnancy. The aqueous root extract was also tested for the functions of estrogenic, anti-estrogenic, progest, and anti-progestation[10].

Hepato-protective Effects: The treatment of liver diseases with the help of this plant has been explored in many studies. Methanol extract of the moringa plant has a hepatoprotective outcome that may be attributed to the presence of quercetin. In addition to reductions in lipids and lipid peroxidation levels in the liver of rats, MO leaves had important effects on the levels of aspartate aminotransferase, alanine aminotransferase, and alkaline phosphatase. Its leaves reduce amounts of plasma, AST, ALT, ALP and enhance drug-induced liver and kidney damage. Similar results were observed in rats co-treated with Moringa leaves and NiSO₄ to induce toxicity in the kidneys, and the same results were seen in rats[11,12].

Anti-inflammation and Immunomodulatory Effects: After healing with extracts of roots, bulbs, pods, stems, leaves, and seeds, the anti-inflammation activity of Moringa oleifera was noticed. In research involving rats, M. Oleifera root extract decreased paw edema growth, with results close to those obtained by the non-steroidal anti-inflammatory medication phenylbutazone, which has analgesic and antipyretic properties. Moreover, a study of patients with mild to moderate asthma showed that the seed powder of Moringa oleifera remarkably improved the forced vital capacities, peak expiration flow, forced expiratory volume without any adverse reactions. A variety of bioactive compounds may be involved in Moringa oleifera's anti-inflammatory effects, such as quercetin[13,14].

Antioxidant Effects: They may be used against inflammatory disorders, like cancer, diabetes, hypertension, and cardiovascular diseases, because of the high concentrations of antioxidants found in MO leaves. It has been demonstrated that the beta carotene in MO leaves acts

as an antioxidant. Only when ingested in combination can antioxidants have the most significant impact on harm due to free radicals [15]. A fusion of antioxidants present in leaves, probably because of synergistic procedure and enhanced antioxidant cascade techniques, is more efficient than a single antioxidant. Recent research in children found that an essential source of vitamin A may be MO leaves. Different bioactive compounds are present in the MO leaves extract, which has medicinal properties. Antioxidant agents, antimicrobial and anti-carcinogenic agents are effective compounds. Because of their properties for lipid-free radicals inactivation or to prevent the decomposition of hydroperoxides, phenolic compounds are well known to serve as primary antioxidants [16,17].

Others: Moringa functioned along with magnetic nanoparticles in surface water treatments, including iron oxide, which was significant by minimizing settling time. Extracts of seed have many antimicrobial effects which impede bacteria growth, which means diseases regarding water are prevented [18]. MO seeds properties have inclusive relevancy for disease prevention and, as they are incredibly abundant, can improve the life quality in the rural community. Moringa seeds can be utilized in grease paints, which are biodiesel sources, while seed cakes used as green compost or fertilizers. Moringa flowers are used for the manufacture of tea with hypo-cholesterolemic properties. When sauteed, its flowers are called to have a flavor like mushrooms. Wide sources of nectar are the moringa flowers and can be used by beekeepers [19,20]. The root wood or bark has therapeutic values and is used for heart criticism, dyspepsia, and eye diseases. Moringa root is consumed as a spice. In calico silk printing, the gum of the tree may be used. There are also antibacterial properties, antifungal effects, and anti-inflammation properties present in discharge and roots [21-23].

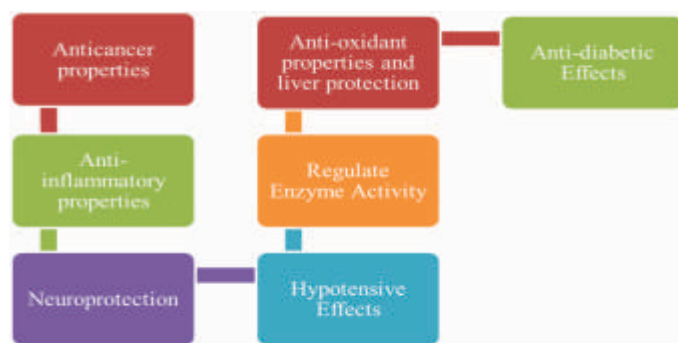


Figure 1: Therapeutic properties of Moringa Oleifera

CONCLUSION

Moringa oleifera has been identified as an enriched source of phytoconstituents of nutritional significance that can produce nutraceuticals and functional foods. The MO plant is

the most cost-effective and realistic option for not only nourishment, but also for the treatment and prevention of a variety of ailments. As we consider so many uses of the moringa plant, its seed derives significance from its beneficial effects, disease control effects, nutritional values, purifying techniques, commercial and industrial applications. The nutrients of this miracle tree must be demoralised for several tasks. There are excellent anti-cancer, anti-diabetic, antioxidant, anti-dyslipidemic, and chemoprotective properties of *M. Oleifera*. Further research is required to explore the impact of environmental conditions on the nutritional content of leaves and other components of Moringa Full-fledged around the globe.

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