



ISSN (E): 2320-3862

ISSN (P): 2394-0530

NAAS Rating: 3.53

www.plantsjournal.com

JMPS 2021; 9(2): 15-17

© 2021 JMPS

Received: 25-12-2020

Accepted: 15-01-2021

Sreeja M

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Jayasri. P

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Keerthi. N

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Yeshashwini. J

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Praveen. J

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Corresponding Author:

Sreeja M

Joginpally BR Pharmacy
College, Moinabad, Telangana,
India

Moringa oleifera: A review on nutritive importance and its potential use as nutraceutical plant

Sreeja M, Jayasri P, Keerthi N, Yeshashwini J and Praveen J

Abstract

The use of natural plant products with smaller side effects has gained popularity over the years. The foods that can impart health benefits beyond conventional nutrients, there is enormous scope. One such tree which has enormous nutritional and medicinal benefits is *Moringa oleifera*. *Moringa oleifera* Lam. belongs to the Moringaceae family, is a perennial deciduous tropical tree and is rich in macro and micro nutrients such as proteins, carbohydrates, calcium, phosphorus, potassium, iron, vitamins, beta carotene and other bioactive compounds that are necessary to the normal functioning of the body and the prevention of some diseases. Many parts of *Moringa oleifera* including leaves, flowers and seeds, are edible and other parts such as bark, are used in the production of biodiesel and the purification of water. *Moringa oleifera* also includes anticancer, anti-ulcer, antimicrobial, antioxidant and has immense therapeutic properties.

Keywords: Beta-carotene, flavonoids *Moringa oleifera*, nutraceutical, pharmacological potential

Introduction

Moringa oleifera Lam. (*M. oleifera*) belongs to the family Moringaceae and is a cruciferous herb. *M. Oleifera* is commonly referred to by locals as the drumstick tree and is a prominent staple in various parts of the world (Anwar *et al.*, 2007) [2]. The drumstick tree is a small fast growing ornamental tree which is native to India. The trees are said to have been originated from Agra and Oudh in North Western region of India to South of the Himalayan Mountains (Prabhu *et al.*, 2011) [12]. The tree is claimed to have potential to improve nutrition, increase food security, and encourage rural development (Abou and Nadir, 2014) [1]. *M. Oleifera* is eaten not only because of its nutritional value, but also because of its medicinal benefits and leaves are rich in vitamin C, vitamin E, beta-carotene, and polyphenols and are a good source of natural antioxidants. A wide range of biological functions, including anti-inflammatory, anti-cancer, hepatoprotective and neuroprotective functions, are documented. Furthermore, numerous studies have shown its therapeutic benefit including anti-diabetes, anti-rheumatoid arthritis, anti-atherosclerosis, anti-infertility, pain relief, anti-depression, and diuretic and thyroid control. The bioactivity of *M. oleifera* due to the recorded functions over the last decade it has received considerable attention, leading to a growing exploration and understanding of its pharmacological roles and underlying mechanisms (Joshi and Mehta, 2010) [7].

Nutritional importance

Among the different species, *M. oleifera* contained the highest amounts of β -carotene, ascorbate (Vit C), α -tocopherol (Vit E) and iron, and was the second highest in protein content. Moringa is a good source of many nutrients. There are high concentrations of crude proteins and amino acids in the leaves and other parts of the tree, comparable to soybean. Oligosaccharides and oxalate were reported as anti-nutrient factors in Moringa leaves (Freiberger *et al.*, 1998) [4]. Vitamins such as vitamin A, which is essential for eye & hair health, vitamin C, and other vitamins from the B group. Minerals such as calcium that helps build bones & teeth can cause rickets, bone pain, osteoporosis, etc. Eight ounces of Moringa leaves are said to supply 1000 mg of calcium and dry Moringa powder will supply 4000 mg of calcium, while milk only supplies 300-400 mg of calcium (Gopala *et al.*, 2016) [5]. The body also requires phosphorus, which has a role in the formation of bones and teeth, to make protein

for growth, ATP, maintenance, cell and tissue repair. Moringa's zinc content is also in line with dietary requirements, which is essential for the synthesis of RNA & DNA fiber that helps to maintain a healthy gut. Tannins, alkaloids, phenolic compounds, amino acids, sterols and carbohydrates are bioactive compounds (Masurekar *et al.*, 2014) ^[9].

Uses of different parts of *Moringa Oleifera*

1. Drumstick tree leaves are filled and 100 percent edible with nutritious properties. They are a rich source of nutrients such as protein, carbohydrates, fiber, vitamin C, beta carotene and minerals such as calcium, potassium, iron and phosphorus. The leaves contain antioxidant compounds of different kinds, such as ascorbic acid, flavonoids, carotenoids and phenolic compounds, and function as a natural antioxidant (Joshi and Mehta, 2010) ^[7].
2. Moringa flowers are a good nectar source for the production of honey. They can be consumed raw with salads, can be used for tea making, can be consumed after blanching, etc.
3. Pods contain a molar ratio of 1:1:1:1 of the polysaccharides d-galactose, 6-O-Me-D-galactose, D-galacturonic acid, l-arabinose and l-rhamnose and nitriles, isothiocyanate and thiocarbamates (Masurekar *et al.*, 2014) ^[9].
4. Antimicrobial activity is also present in seed oil. The antimicrobial activity is due to the benzyl iso-thiocyanate compound 4 (alpha-L rhamnosyloxy), whose mode of action involves either inhibiting the essential enzymes or disrupting the cell membrane (Masurekar *et al.*, 2014) ^[9].
5. The Moringa foliage contains more polyunsaturated fatty acids (PUFA) than saturated fatty acids, which is good for health (Sultana *et al.*, 2017) ^[14].

Potential pharmacological effects

Anti-cancer and anti-tumour activity

In a research by Berkovich *et al.*, (2013) ^[3] *M. oleifera* leaves on the human pancreatic cancer cell line Panc-1 were investigated. The viability of Panc-1 cells was significantly decreased by *M. oleifera* extracts, either alone or together with cisplatin. Treatment with cold aqueous extracts for human lung cancer cells. *M. Oleifera* leaves (10 to 200 µg/mL) induced apoptosis and also decreased cancer cell proliferation and invasion, as well as internal reactive oxygen species levels (Jung, 2014) ^[8].

Antimicrobial activity

The *M. Oleifera* roots extract have been reported to contain an active pterygospermine antibiotic that has strong antibacterial and fungicidal effects. A deoxy-niazimicine aglycone isolated from the chloroform fraction of ethanol extract. It is known that *M. oleifera* root bark is responsible for antibacterial and antifungal activities. Although the juice exhibits an antibacterial activity against *Staphylococcus aureus* from the stem bark. The promising anti-bacterial properties of *M. oleifera* have a significant inhibitory effect on Gram-positive microbes (Peixoto *et al.*, 2011) ^[11].

Antioxidant activity

Typically, polyphenol-rich natural compounds have significant antioxidant properties and may mitigate tissue oxidative damage by scavenging free radicals. An extract of methanol with Chlorogenic acid, rutin, quercetin glucoside

and kaempferol rhamnoglucoside are present in the *M. oleifera* leaves, while multiple procyanidin peaks are observed in the root and stem barks. Due mainly to its high content of bioactive polyphenols, the Moringa genus has high antioxidant activity. Extracts of *M. oleifera* from both mature and tender leaves show good antioxidant activity against free radicals and escape oxidative damage due to polyphenol enrichment (Sreelatha *et al.*, 2009) ^[13].

Neuroprotective activity

In harsh treatment conditions, *M. oleifera* has been shown to promote neuronal outgrowth and survival. A 30 µg/mL ethanol extract concentration from the leaves of *M. Oleifera* in a concentration-dependent will promote the outcome of neurites and neuronal differentiation from primary embryonic neurons. To increase the number and length of dendrites and axonal branches, the length of axons and eventually promote synaptogenesis with *M. oleifera* leaf extract has been observed. In rats with aluminum chloride-induced temporal cortical degeneration protected against aluminum chloride-induced neurotoxicity of the temporal cortex of rats by minimizing expression of neuron-specific enolase (NSE) and glial fibrillary acid protein with *M. oleifera* leaf extract at a dose of 300 mg/kg for 28 consecutive days (Hannan *et al.*, 2014) ^[6].

Anti-inflammation activity

A reduction in carrageenan-induced rat paw edema, which is comparable to aspirin, was seen in *M.oleifera* seed extract (MSE) enriched with isothiocyanatin. In vitro, its major isothiocyanate (MIC-1) at a dose of 5 µM can reduce inflammatory cytokines significantly. In contrast to curcumin, MIC-1 at a dose of 10 µM may also have stronger effects on nuclear factor upregulation (erythroid-derived 2)-like 2 (Nrf2) NAD (P)H target genes: quinone oxidoreductase 1 (NQO1), glutathione S-transferase pi 1 (GSTP1) and heme oxygenase 1 (GSTP1) (HO-1) (Park *et al.*, 2011) ^[10]. It can be considered as an alternative remedy for inflammatory bowel disease (IBD) and the preventive strategy of its recurrence in acetic acid-induced acute colitis rat model.

Conclusion

Moringa oleifera is an excellent source of antioxidants, including macro- and micro-nutrients. *Moringa oleifera* leaves are not as common all over the world as other leafy vegetables, such as spinach and fenugreek. The literature available offers a full description of the plant's chemical components, nutritional content, possible uses and pharmacological activities. By performing its strong anti-inflammatory activity, reducing oxidative stress by scavenging free radicals, and enhancing neuroprotective functions. *M. oleifera* possesses a wide variety of medicinal and therapeutic properties. Due to its protection, *M. oleifera* can be viewed as a nutraceutical product or food, which will promote the exploration of its ability to cause autophagy in the future for the prevention and treatment of chronic diseases.

References

1. Abou ZA, Nadir AS. Quality Evaluation of Nutritious Chocolate and Halawa Tahinia Produced with Moringa (*Moringa oleifera*) Leaves Powder. Middle East J Applied Sci 2014;4(4):1007-1015.
2. Anwar Latif F, Ashraf S, Gilani AHM. *Moringa oleifera*: A food plant with multiple medicinal uses. Phytother.

- Res 2007;21:17-25.
3. Berkovich L, Earon G, Ron I, Rimmon A, Vexler A, Lev-Ari S. *Moringa oleifera* aqueous leaf extract down-regulates nuclear factor-kappaB and increases cytotoxic effect of chemotherapy in pancreatic cancer cells. BMC Compl. Alternative. Med 2013;13:212.
 4. Freiberger CE, Vanderjagt DJ, Pastuszyn A, Glew RS, Mounkaila G, Millson M, Glew RH. Nutrient content of the edible leaves of seven wild plants from Niger. Plant Foods for Hum. Nutr 1998;53:57-69.
 5. Gopala KL, Doriya K, Kumar DS. *Moringa oleifera*: A review on nutritive importance and its medicinal application. Food Science and Human Wellness 2016;5:49-56.
 6. Hannan MA, Kang JY, Mohibullah M, Hong YK, Lee H, Choi JS *et al.* *Moringa oleifera* with promising neuronal survival and neurite outgrowth promoting potentials. J Ethnopharmacol 2014;152:142-150
 7. Joshi P, Mehta D. Effect of dehydration on the nutritive value of drumstick leaves. Journal of Metabolomics and Systems Biology 2010;1(1):5-9.
 8. Jung IL. Soluble extract from *Moringa oleifera* Nigeria. J Nat. Prod. Plant. Res. Leaves with a new anticancer activity. PloS One, 9: Morton, J.F., 1991. The horseradish tree, *Moringa* e95492 2014;2:107-112.
 9. Masurekar T, Kadam SV, Jadhav V. Roles of *Moringa oleifera* in medicine - a review. World Journal of Pharmacy and Pharmaceutical Sciences 2014;4(1):375-385.
 10. Park E, Cheenpracha J, Chang S, Kondratyuk LC, Pezzuto TP, JM. Inhibition of lipopolysaccharide-induced cyclooxygenase-2 and inducible nitric oxide synthase expression by 4-[(2'-O-acetyl-alpha-L-rhamnosyloxy) benzyl] isothiocyanate from *Moringa oleifera*. Nutr. Cancer 2011;63:971-982.
 11. Peixoto JR, Silva GC, Costa RA, de Sousa FJ, Vieira GH, Filho AA, Dos FVR. *In vitro* antibacterial effect of aqueous and ethanolic *Moringa* leaf extracts. Asian Pac. J Trop. Med 2011;4:201-204.
 12. Prabhu R, Rajan A, AP, Santhalia S. Comparative analysis of preservation techniques on *Moringa oleifera*. Int. J of Agricultural and Food Science 2011;1(2):12-22.
 13. Sreelatha S, Padma PR. Antioxidant activity and total phenolic content of *Moringa oleifera* leaves in two stages of maturity. 2009. Plant Foods Hum. Nutr 2011;64:303-311.
 14. Sultana N, Alimon AR, Huque KS, Sazili AQ, Yaakub H, Hussain SMJ. Study of Anti-nutritional Compounds, Antioxidant Activity and Fatty Acid Composition of *Moringa (Moringa oleifera* Lam.) Foliage. Asian Journal of Agriculture and Food Sciences 2017;5(3):144-150.