

Moringa oleifera Lam. A miraculous medicinal plant: Review

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Abstract: The purpose of the review is to provide general information and research studies of *Moringa oleifera* to researchers to search the new phyto-constituent or molecules from the plant that may be valuable for therapeutic purpose. *M. oleifera* is a popular medicinal and vegetable plant. It is commonly distributed in different part of world. It has many therapeutic effects. It is also well known for its nutritional value. It contains many minerals such as calcium, potassium, magnesium, vitamin A, and C, beta-carotene quercetin and kaempferol. It possesses several pharmacological activities such as antioxidant, anti-inflammatory, cardioprotective, antibacterial, antifungal and gastroprotective activity. The present review provides the information regarding the phytoconstituents and pharmacological potential of the plant.

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INTRODUCTION

Moringa oleifera Lam. is a well-known medicinal plant. It is found in several countries of the world. It has many medicinal and nutritional properties. The plant possess minerals, vitamins, amino acids, beta-carotene and proteins (1). This plant is also used as a vegetable and many countries used its leaves and buds in headache. Its root bark is anti-scorbutic. The leaves extract mixed in honey is used in eye disorder (2). This plant is also used in pain and inflammations (3). The dried seeds are used as tonic, purgative, venereal infections, and it is also used in ophthalmic preparations (4).

Taxonomical Classification

Kingdom – Plantae, Subkingdom – Tracheobionta, Super Division – Spermatophyta, Division – Magnoliophyta, Class – Magnoliopsida, Sub class – Dilleniidae, Order – Capparales, Family – Moringaceae, Genus – Moringa, Species – oleifera (5)

Synonyms

Latin – *Moringa oleifera*, Hindi – Saguna, Tamil – Mulaga, Gujarati – SuragavoMunaga Punjabi – Sainjna, Ayurvedic – Haritashaaka, Raktaka, Akshiva, Unani – Sahajan, Arabian – Rawag, English - Drumstick tree, Horseradish tree(5).

Botanical description

The plant is 8 meter in height. It has corky and whitish gray bark. It is a deciduous tree. It has fragile and spreading branches. The leaves are pinnate, alternate, compound 25-50cm long, 2-9 leaflets. Leaflets are thin, slender, ovate, 1-2 cm long. Flowers are fragrant, stalked, white on spreading panicles, bisexual, fragrant, zygomorphic, cleft calyx, Spathulate petals, Five stemen, one celled ovary and slender style. Fruits trilobed capsules known as pods. Pods are pendulous, brown triangular, 1.8 cm wide. fruits occur in March and April. Unripe pods are green in color and on ripening they have a brown color. Seeds are three angles, round, diameter one centimeter, winged (6).

Photochemistry

Different parts of *M. oleifera* contains Glucosinolates, Flavonoids and Phenolic acids, Carotenoids Tocopherols, Polyunsaturated fatty acids, Folate benzyl glucosinolate (glucotropaeolin), Flavonol Glycosides Quercetin, Kaempferol, Isorhamnetin. Polyunsaturated fatty acids such as α -linolenic acid and linoleic acid, Potassium (K), Calcium (Ca) and Magnesium (Mg). Flavonoids, Tannins, Carotenoids, Saponins, Polyphenols, Isothiocyanates, Phytates, Oxalates, Alkaloids, Glucosinolates, Vitamin A, Vitamin B1-Thiamine,

Vitamin B2-Riboflavin, Vitamin B-3 Niacin, Beta carotene, Lutein, Caffeic acid, Ellagic acid, Gallic acid, Ferulic acid, Gentistic acid, Sinapic acid, Apigenin, Rutin, Methionine, cysteine, 4-(alpha-L - rhamnopyranosyloxy) benzylglucosinolate, Moringine, benzylglucosinolate, niazimicinniazirin. Isothiocyanate, nitrites, thiocarbamates, O-(1heptenylox y) propyl undecanoate, O-ethyl-4-(alpha-L-rhamnosylox y) benzyl carbamate, methyl-p-hydroxybenzoate, beta-sitosterol. Moringine, spirachin, moringinine, 1,3-dibenzyl urea, p-cymene, alpha- phellandrene, Deoxy-niazimicine, 4-(alpha-L -rhamnopyranosyloxy) benzylglucosinolate (7).

Pharmacological properties

Antibacterial and Antifungal Efficacy

M. oleifera has antibacterial effect against *B. subtilis*, *K. pneumoniae*, *E. coli*, *P. aeruginosa*, *S. aureus*. It is also evaluated against fungi and observed antifungal activity against *A. niger*, *A. oryzae*, *A. nidulans* and *A. terreus*.

Anti-oxidant Effect

Different antioxidant studies were carried on Moringa and found that it possesses antioxidant activity and this may be due to beta-carotene, vitamin A and C, glucosinolates, thiocarbamates, isothiocyanates, and flavonoids (8). Moringa aqueous extract exhibits antioxidant activity against 2, 2-diphenyl-2-picrylhydrazyl (DPPH) free radical, nitric oxide, superoxide radical and inhibits of lipid peroxidation (9).

Gastric Protective effect

Das *et al.*, determine an antiulcer property of aqueous extracts in experimental animals of inducing ulcers was studied. The *M. oleifera* leaves extract significantly reduced the ulcer. The result was similar to the standard drugs in ibuprofen-induced ulcer methods (10). In another study, its aqueous extract also possesses antiulcer effects in rats model in indomethacin-induced ulcers (11).

Analgesic Activity

The alcoholic extract and its various fractions as ethyl acetate, Diethyl ether, Petroleum ether,

n-Butanol exhibited analgesic activity. The effect was similar to aspirin the standard drug (12).

Local Anesthetic Activity

Its methanol extract was evaluated on guinea pig and frogs for anesthetic activity. Results showed in the study that it possesses anesthetic activity.

Anti-Inflammatory

Ndiaye *et al* (2002) studied the anti-inflammatory effect of Moringa roots extract and found that an aqueous extract of roots exhibited significant anti-inflammatory activity (13). It's isolated compounds 4-[(2'-O-acetyl-alpha-l-rhamnosyloxy)benzyl] isothiocyanate exhibited strong NO-inhibitory activity (14).

Antinociceptive Activity

Sulaiman *et al.* (2008) studied the antinociceptive potential of leaves aqueous extract of *M. oleifera*. The extract exhibited significant antinociceptive activity and anti-inflammatory potential in a dose-dependent manner (4).

Cardio-protective Activity

Hydroalcoholic *M. oleifera* extract possesses cardio-protective effect in myocardial infarction via isoproterenol induced method (15).

Wound curing property

Aqueous leaves extract of *M. oleifera* possesses wound healing activity in rat models.

Hypotensive and Spasmolytic activities

M. oleifera has hypotensive and spasmolytic activity. The hypotensive activity of Moringa extract. The study showed that its different parts possess significant hypotensive activity (16).

Anthelmintic

The plant possesses potent anthelmintic activity (17).

Hypolipidaemic and Anti-atherosclerotic Activities

Chumark *et al.* (2008) studied hypolipidaemic and antiatherosclerotic potential of *Moringa* and observed that the water extract of the plant

significantly possesses hypolipidaemic activity. The plant lowered the level of cholesterol and formation of atherosclerotic plaque (18).

Antirolithiatic Activity

The alcoholic and aqueous extracts of *M. oleifera* have antirolithiatic activity. The studied was conducted in the albino rat's model. Administration of both extracts of plant considerably decreased the elevated level of urinary oxalates (19).

CONCLUSION

Moringa oleifera is valuable medicinal plant. It

is commonly used species of the Moringaceae family. Its different parts possess different therapeutic effects and they are used in many disorders. Different pharmacological effects were reported such as anti-microbial, anti-inflammatory, anti-cancer, antifungal, analgesic, anti-ulcer, anthelmintic, antioxidant, and wound healing property etc. This review helps researchers to investigate further to isolate active molecule for novel herbal medicine.



Figure 1



Figure 2

REFERENCES

1. Anwar F, Latif S, Ashraf M, Gilani AH. Moringa oleifera: a food plant with multiple medicinal uses. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*. 2007;21(1):17-25.
2. Rathi B, Bodhankar S, Baheti A. Evaluation of aqueous leaves extract of Moringa oleifera Linn for wound healing in albino rats. 2006.
3. Sulaiman MR, Zakaria Z, Bujarimin A, Somchit M, Israf D, Moin S. Evaluation of Moringa oleifera aqueous extract for antinociceptive and anti-inflammatory activities in animal models. *Pharmaceutical biology*. 2008;46(12):838-45.
4. Sutar NG, Bonde C, Patil V, Narkhede S, Patil A, Kakade R. Analgesic activity of seeds of Moringa oleifera Lam. *International Journal of Green Pharmacy (IJGP)*. 2008;2(2).
5. Nithiyantham S, Siddhuraju P, Francis G. Potential of *Jatropha curcas* as a biofuel, animal feed and health products. *Journal of the American Oil Chemists' Society*. 2012;89(6):961-72.
6. Fatima A, Alok S, Agarwal P, Singh PP, Verma A. Benefits of herbal extracts in cosmetics: a review. *Int J Pharm Sci Res*. 2013;4:3746.
7. Saini RK, Sivanesan I, Keum Y-S. Phytochemicals of Moringa oleifera: a review of their nutritional, therapeutic and industrial significance. *3 Biotech*. 2016;6(2):203.
8. Kekuda TP, Mallikarjun N, Swathi D, Nayana K, Aiyar MB, Rohini T. Antibacterial and Antifungal efficacy of steam distillate of Moringa oleifera Lam. *Journal of Pharmaceutical Sciences and Research*. 2010;2(1):34.
9. Bharali R, Tabassum J, Azad MRH. Chemomodulatory effect of Moringa oleifera, Lam, on hepatic carcinogen metabolising enzymes, antioxidant parameters and skin papillomagenesis in mice. *Asian Pacific Journal of Cancer Prevention*. 2003;4(2):131-40.
10. Sreelatha S, Padma P. Antioxidant activity and total phenolic content of Moringa oleifera leaves in two stages of maturity. *Plant foods for human nutrition*. 2009;64(4):303.
11. Das D, Dash D, Mandal T, Kishore A, Bairy K. Protective effects of Moringa oleifera on experimentally induced gastric ulcers in rats. *Research Journal of Pharmaceutical, Biological and Chemical Sciences*. 2011;2(2):50-5.
12. Wadhwa S. A review on commercial, traditional uses, phytoconstituents and pharmacological activity of Moringa oleifera. *Global journal of traditional medicinal systems*. 2013;2(1):01-13.
13. Biswas SK, Chowdhury A, Das J, Roy A, Hosen SZ. Pharmacological potentials of Moringa oleifera Lam.: a review. *International Journal of Pharmaceutical Science Research*. 2012;3(2):305-10.
14. Ndiaye M, Dieye A, Mariko F, Tall A, Sall AD, Faye B. Contribution to the study of the anti-inflammatory activity of Moringa oleifera (Moringaceae). *Dakar medical*. 2002;47(2):210-2.
15. Cheenpracha S, Park E-J, Yoshida WY, Barit C, Wall M, Pezzuto JM, et al. Potential anti-inflammatory phenolic glycosides from the medicinal plant Moringa oleifera fruits. *Bioorganic & medicinal chemistry*. 2010;18(17):6598-602.
16. Nandave M, Ojha SK, Joshi S, Kumari S, Arya DS. Moringa oleifera leaf extract prevents isoproterenol-induced myocardial damage in rats: evidence for an antioxidant, antiperoxidative, and cardioprotective intervention. *Journal of medicinal food*. 2009;12(1):47-55.
17. Rastogi T, Bhutda V, Moon K, Aswar P, Khadabadi S. Comparative studies on anthelmintic activity of Moringa oleifera and Vitex negundo. *Asian J Research Chem*. 2009;2(2):181-2.
18. Chumark P, Khunawat P, Sanvarinda Y, Phornchirasilp S, Morales NP, Phivthong-ngam L, et al. The in vitro and ex vivo antioxidant properties, hypolipidaemic and antiatherosclerotic activities of water extract of Moringa oleifera Lam. leaves. *Journal of ethnopharmacology*. 2008;116(3):439-46.
19. Karadi RV, Gadge NB, Alagawadi K, Savadi RV. Effect of Moringa oleifera Lam. root-wood on ethylene glycol induced urolithiasis in rats. *Journal of ethnopharmacology*. 2006;105(1-2):306-11.