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A Review On Moringa Oleifera

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Abstract:

This analysis delves into the myriad qualities exhibited by *Moringa oleifera*, commonly recognized by its colloquial name, the drumstick tree. The plant, rich in essential phytochemicals, is native to Africa and Asia, thriving in tropical and sub-tropical regions. Renowned for its nutritional richness, *Moringa* is abundant in vitamins, minerals, and antioxidants, demonstrating its efficacy in various beneficial roles, including anti-inflammatory, antidiabetic, antimicrobial, and antihypertensive activities. The chemical constituents of *Moringa oleifera* include Vitamins, Carotenoids, Tannins, Saponin, Phenolic acid, and Minerals, contributing to its health-promoting properties. Examining pharmacological aspects, *Moringa oleifera* demonstrates potential in Anti-inflammatory, Antidiabetic, Antimicrobial, Antihypertensive, Analgesic, Anticancer and Antispasmodic activities. These findings suggest a broad spectrum of health benefits, though further research is crucial for real-world applications. Understanding the plant's versatility offers insights into its potential contributions to various industries and health domains.

Keywords: *Moringa oleifera*, Chemical constituent, Antioxidant, Anti-inflammatory, Health

Introduction-

Moringa oleifera, frequently dubbed the miraculous tree, is part of the Moringaceae botanical family. *Moringa oleifera*, a plant renowned for its healing properties, boasts a wealth of vital phytochemicals present in its leaves, flowers, pods, and seeds, enhancing its broad spectrum of health-boosting elements. Studies have revealed remarkable nutritional superiority in *Moringa* compared to traditional sources. It boasts seven times the vitamin C content of oranges, ten times the vitamin A of carrots, seventeen times the calcium found in milk, nine times the protein of yogurt, fifteen times the potassium levels of bananas, and twenty-five times the iron content of spinach.^[1,4,10,21]

Common name - Miracle tree, horseradish tree.

Location – *Moringa oleifera*, originating from regions in Africa and Asia, is characterized by its rapid growth and ability to thrive in arid conditions, making it a resilient and drought-resistant tree.

Cultivation - It thrives in regions characterized by tropical and subtropical climates. *Moringa oleifera* can grow in any soil condition but prefer drained, loamy and sandy soil with the temperature range for growing

Moringa oleifera is 21-35°C. The pH of *Moringa oleifera* typically falls within the range of slightly acidic to neutral, approximately ranging from pH 5 to 9. [2,19]

Pharmacognostic Studies -

Vernacular names of *Moringa oleifera* in different states of India [2,20]

| Language | Vernacular name |
|----------|-----------------|
| English | Moringa |
| Hindi | Shahjan |
| Bengali | Shojne |
| Marathi | Saragva |
| Tamil | Murungai |
| Sanskrit | Shobhanjana |

Table 1

Plant Profile -

Taxonomy: [2,6,20]

| | |
|------------|---------------|
| Kingdom | Plantae |
| Family | Moringaceae |
| Order | Brassicales |
| Subkingdom | Tracheobionta |
| Division | Angiospermae |
| Class | Magnoliopsida |
| Subclass | Rosidae |
| Genus | Moringa |
| Species | Oleifera |

Table 2**Morphology:** ^[20]

| | |
|--------|--|
| Colour | Leaves- dark green Roots- brown Bark- corky to grey Flower- white to cream Fruit- green to brown |
| Shape | Leaves- elliptical to obovate Flower- pentamerous, zygomorphic |
| Size | Leaves- 7-60cm Root- upto 15m Bark- 10-12m Flower- 1-1.5cm Fruit- 20-45cm |
| Odour | Earthy |
| Taste | Bitter |

Table 3**Fig 1. Moringa olifera flower**



Fig 2. Moringa olifera leaves



Fig 3. Moringa olifera bark



Fig 4. Moringa olifera fruit

Chemical constituents:-

Moringa oleifera consists of numbers of chemical which can use as a health promoter also and these are vitamins (Vitamin A, Vitamin B, Vitamin C) Carotenoids, proteins, Tannins, Saponin, phenolic acid, Isothiocyanates, Minerals(Calcium, Iron, Potassium and magnesium). ^[10, 11, 14, 17]

The, Thiocarbamates, Glycosides & Nitriles present in this plant contribute to its ability to reduce blood pressure. ^[10]

Moringa oleifera is a rich source of iron which Increase the hemoglobin which can ease the mensuration cramps and also helps in during the pregnancy.

The presence of the flavonoids, phenols, antioxidants can give the analgesic as well as anti-inflammatory effects.

Pharmacological Properties :-

Anti-inflammatory activity:- Inflammation is the innate reaction of the body to injury, infection, or irritation, serving as a natural response mechanism. Common signs of inflammation include redness, swelling, heat, and pain at the affected site. *Moringa oleifera* possesses anti-inflammatory property because of the presence of Isothiocyanates. Studies have investigated the potential anti-inflammatory properties of *Moringa oleifera*, linking this trait to its rich reservoir of bioactive compounds like polyphenols and isothiocyanates. These compounds may help reduce inflammation in the body, providing potential benefits for various conditions. ^[1]

Antidiabetic activity:- *Moringa oleifera* has been explored for its potential antidiabetic effects. Research indicates that elements in *Moringa oleifera*, including quercetin, chlorogenic acid, kaempferol, glucomoringin and isothiocyanates might contribute to reducing blood sugar levels by enhancing insulin sensitivity. Additionally, *Moringa oleifera* may have antioxidant properties that protect pancreatic beta cells, which play a crucial role in insulin production. ^[4,13]

Antimicrobial activity :- *Moringa oleifera* has demonstrated antimicrobial properties, attributed to its various bioactive compounds, including alkaloids, flavonoids, and phenolic acids. These components may exhibit antibacterial, antifungal, and antiviral activities. *Moringa oleifera* has been studied for its potential to inhibit the growth of certain bacteria and fungi, showing promise as a natural antimicrobial agent. The antimicrobial activity of *Moringa oleifera*'s methanol extract is attributed to the presence of 4-(α -L-rhamnopyranosyloxy) benzyl isothiocyanate, a chemical compound isolated from the plant. ^[1,4,10]

Antihypertensive activity:- *Moringa oleifera* has been investigated for its potential antihypertensive (blood pressure-lowering) effects. Bioactive compounds such as quercetin, chlorogenic acid, and isothiocyanates present in *Moringa* could potentially aid in dilating blood vessels and reducing blood pressure. ^[13]

Ocular activity:- Studies have investigated the possible benefits of *Moringa oleifera* for eye health. The plant harbors essential nutrients such as Vitamin A, Vitamin C, Beta-carotene and Zinc, crucial for maintaining eye health. These nutrients contribute to the maintenance of the cornea, prevention of age-related macular degeneration (AMD), and overall support for good vision. ^[6]

Antilipidemic activity:- *Moringa oleifera* has been investigated for its potential antilipidemic effects, referring to its ability to lower lipid levels in the blood. Some studies suggest that *Moringa oleifera* may have a positive impact on lipid profiles by reducing levels of cholesterol and triglycerides. This effect is attributed to bioactive compounds like quercetin, beta-sitosterol, and chlorogenic acid found in *Moringa oleifera*. ^[13]

Analgesic activity:- *Moringa oleifera* has been explored for potential analgesic effects. Some studies suggest that certain compounds in *Moringa*, such as alkaloids and flavonoids, may have mild analgesic properties. ^[6]

Anti-cancer activity:- *Moringa oleifera* has been studied for its potential anti-cancer properties. Compounds found in *Moringa*, namely Thiocarbamate and Isothiocyanate, exhibit properties that hinder the growth of cancerous cell. These effects could potentially play a role in impeding the growth of cancer cells and preventing the spread of tumors. ^[4]

Antiulcer activity:- *Moringa oleifera* has been investigated for its potential antiulcer activity. Some studies suggest that its Antioxidant and Anti-inflammatory properties may help protect the gastric mucosa and alleviate symptoms associated with ulcers. Compounds like Quercetin and Chlorogenic acid found in *Moringa* have been implicated in these protective effects. ^[1]

Cardiovascular activity:- *Moringa oleifera* has been studied for its potential cardiovascular benefits. The presence of Niazirmin A, Niazirimin B, and Niazimincin in *Moringa* appears to be associated with its favorable impact on cardiovascular health. These compounds may contribute to benefits such as blood pressure reduction, cholesterol level decrease, and enhancement of overall heart well-being. ^[4]

Antispasmodic activity:- *Moringa oleifera* has been suggested to possess antispasmodic activity, meaning it may have the ability to alleviate muscle spasms. This potential benefit is attributed to certain bioactive compounds found in *Moringa*, including Flavonoids and alkaloids. Extensive pharmacological research on *Moringa* leaves reveals that the ethanol extract and its components demonstrate Antispasmodic properties, likely by blocking Calcium channels. ^[19]

Utilization of *Moringa oleifera*

Moringa oleifera, known for its adaptability, serves multiple roles, with different components of the plant being utilized for specific functions across various domains. Some common uses include:^[5,6,16,19,20]

1. Nutritional Supplement- *Moringa* leaves are rich in essential nutrients, making them a valuable dietary supplement to address nutritional deficiencies.
2. Culinary Use- *Moringa* Pods, Seeds and Leaves are employed in the kitchen, offering diverse culinary options. The leaves are adaptable ingredients, suitable for enhancing salads, enriching soups, or being prepared as a cooked vegetable.
3. Tea- *Moringa* leaves are used to make a nutrient-rich herbal tea, providing an infusion of vitamins and antioxidants.
4. Oil Extraction- *Moringa* seeds contain oil, which is extracted for various purposes, including cooking, as a base for cosmetics, and in traditional medicine.
5. Water Purification- *Moringa* seeds contain natural compounds that can help clarify and purify water by acting as a coagulant, binding to impurities and allowing them to settle.
6. Medicinal Use- *Moringa* has been explored for its potential health benefits, including Anti-inflammatory, Antioxidant, Antidiabetic, and Hepatoprotective properties.
7. Livestock Feed- *Moringa* leaves and pods are used as a nutritious feed supplement for livestock.
8. Soil Fertilization- *Moringa* plants have been used as a natural fertilizer due to their ability to enhance soil fertility.
9. Cosmetic Products- *Moringa* oil is used in the cosmetics industry for its moisturizing properties, and it is included in various skincare products.
10. Traditional Medicine- Various components of the *Moringa* plant have been employed in traditional medicine to address diverse health issues.
11. Hair Care- *Moringa* oil is used in hair care products for its nourishing properties, promoting healthy hair and scalp.
12. Natural Pesticide- *Moringa* extracts can be used as a natural pesticide to protect crops due to their insect-repelling properties.

13. Agricultural Growth Stimulant- *Moringa* leaf extracts have been explored as a growth stimulant for plants, enhancing crop yields and improving soil fertility.

14. Animal Forage- *Moringa* leaves and pods serve as nutritious forage for animals, providing essential nutrients for livestock.

15. Energy Drink- *Moringa* leaves are sometimes used to prepare energy-boosting drinks, providing a natural source of vitamins and minerals.

16. Immunity Boosting- The nutritional content of *Moringa*, including vitamins and antioxidants, may contribute to boosting the immune system.

17. Soap Production- *Moringa* oil, valued for its skin-friendly attributes, is utilized in the manufacturing of soaps.

18. Biofuel Production- *Moringa* seeds can be used to produce biodiesel, contributing to sustainable energy production.

Conclusion

In conclusion, *Moringa oleifera* is a miraculous tree, notable for its extensive nutritional benefits and wide-ranging practical uses. Originating from Africa and Asia, this resilient plant thrives in various climates and soil conditions. Its pharmacognostic studies reveal a range of chemical constituents, including essential vitamins, minerals, and bioactive compounds, contributing to its therapeutic properties. Pharmacological studies indicate a broad spectrum of health advantages associated with *Moringa oleifera*, including its potential to mitigate inflammation, manage diabetes, combat microbial infections, regulate blood pressure, and potentially exhibit anti-tumor activities. The plant's uses are extensive, ranging from nutritional supplements, culinary applications, livestock feed, and biofuel production.

While research supports many of its purported benefits, continued studies are crucial to fully understand its mechanisms and effectiveness in various applications. Overall, *Moringa oleifera* stands as a valuable resource with promising potential for improving health, nutrition, and sustainable practices.

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