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Pharmacological Properties Of *Moringa Oleifera* (Medicinal Plant): A Review

Ruchi Mishra[1]; Ankur Srivastava[2]; Neha Srivastava[3]; Vikas Yadav[4];Navneet Kumar Verma[*4]
[1]Assistant Professor, B.P.S. Educational Institution of Pharmacy, Etah, U.P, India
[2]Assistant Professor, Institute of Pharmacy, Dr Ram Manohar Lohia Avadh University Faizabad, UP, India
[3]Assistant Professor, Buddha Institute of Pharmacy, GIDA, Gorakhpur, UP, India-273209 Affiliated to Dr. APJ Abdul Kalam Technical University, Lucknow, Uttar Pradesh, India
[4]Associate Professsor, Buddha Institute of Pharmacy, GIDA, Gorakhpur, UP, India-273209 Affiliated to Dr. APJ Abdul Kalam Technical University, Lucknow, Uttar Pradesh, India

ABSTRACT
Angiosperm Moringa oleifera is also referred to as drumstick or sehjan. The miracle tree, also known as moringa oleifera, has been used in traditional medicine for millennia. Different portions of M. oleifera are used to cure a variety of ailments without any reported negative effects, including malnutrition, diabetes, blindness, anaemia, hypertension, stress, depression, skin, arthritis, and problems of the joints and kidney stones. This plant also demonstrated the ability to support the management of breastfeeding in nursing mothers and the preservation of the cardiovascular system, blood glucose levels, and anti-oxidant, anti-inflammatory, and anti-cancer activities. The seed and leaf powder can filter water by causing flocculation. The significant nutritional and preventive qualities of M. oleifera's seed oil have led to its use in the cosmetic and industrial sectors. It has a great deal of healing potential, which is why we refer to it as a magical tree.

Keywords: *Moringa oleifera, Drumstick or Sehjan, Angiospermic Plant*

***Corresponding Author**
Navneet Kumar Verma
Associate Professsor, Buddha Institute of Pharmacy, GIDA, Gorakhpur, UP, India-273209 Affiliated to Dr. APJ Abdul Kalam Technical University, Lucknow, Uttar Pradesh, India

INTRODUCTION

Angiosperm Moringa oleifera is also referred to as the drumstick or horseradish tree. It belongs to the 13 species strong genus Moringa. The most extensively grown of them is Moringa oleifera, which is indigenous to tropical and subtropical regions of the world. A tropical dicotyledonous deciduous tree, Moringa oleifera is a perennial tree. It goes by a variety of names depending on the nation, including "Shiferaw" in Ethiopia, "Drumstick Tree" or "Horseradish Tree" in India, and "Sitalchini," "Munga," or "Sahijan" in Nepal[1]. The vegetable Moringa oleifera is a member of the Moringaceae family and is a member of the Brassica order. With 13 recognised species, the Moringaceae family consists of a single genus[2]. Because it contains a range of vital phytochemicals in its leaves, pods, and other parts of the plant, moringa is a nutritious food. In fact, moringa is claimed to have 25 times more iron than spinach and 25 times more vitamin C than oranges, 10 times more vitamin A than carrots, 17 times more calcium than milk, 9 times more protein than yoghurt, and 7 times more vitamin C than oranges. J.L [3]. Because moringa leaves contain a variety of antioxidant components, including ascorbic acid, flavonoids, phenolics, and carotenoids, they extend the shelf life of foods that contain fat. They are also said to be a healthy source of protein, vitamin C, calcium, and potassium[4,5].

Traditional Medicine

In many cultures around the world, moringa has been used in traditional medicine for centuries to treat a variety of ailments, including skin infections, anaemia, anxiety, asthma, blackheads, blood impurities, bronchitis, catarrh, chest congestion, cholera, conjunctivitis, cough, diarrhoea, eye and ear infections, fever, glandular swelling, headaches, abnormal blood pressure, hysteria, pain in joints, psoriasis, The goal of the current review is to raise public awareness of the advantages of the miracle tree or food plant Moringa. Ancient cultures have recorded that moringa oil has medicinal benefits. Moringa oil offers amazing cosmetic benefits and is utilised as a skin conditioner and moisturiser in body and hair care products. Moringa oil has been used in skin preparations and ointments since Egyptian times[6].

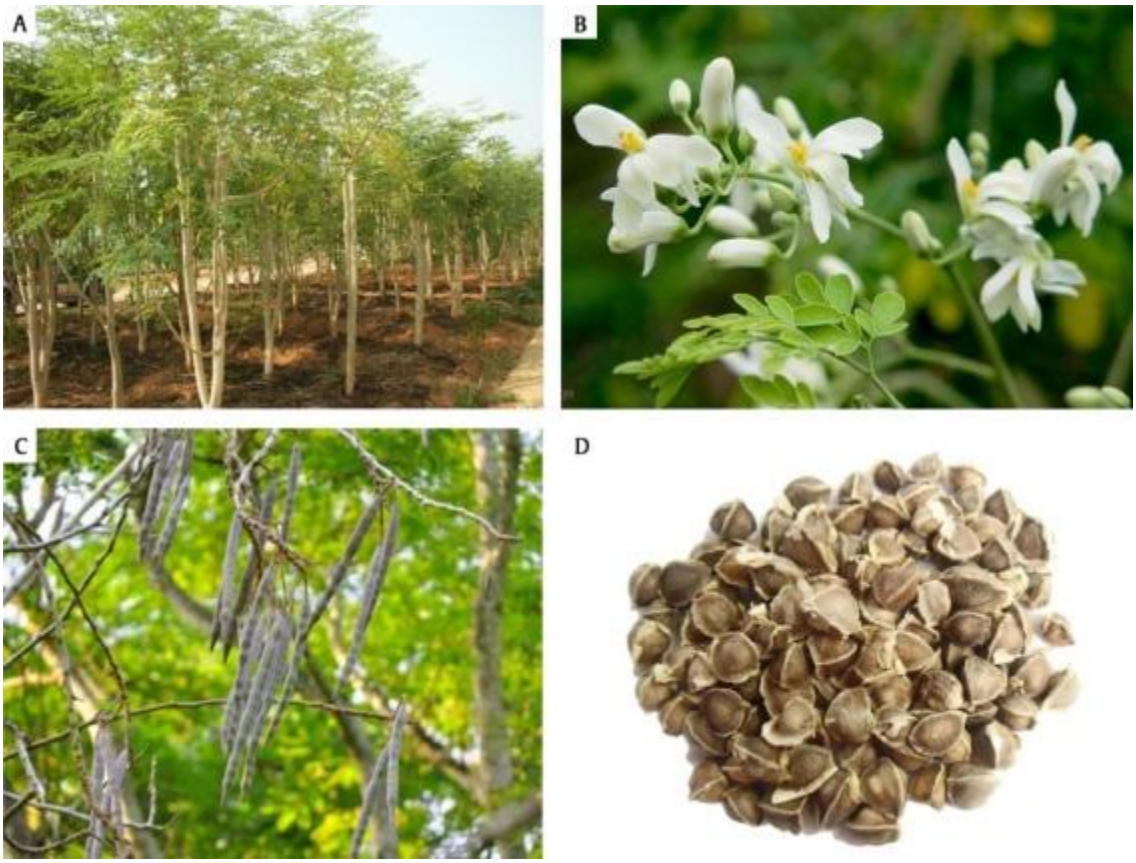

Figure.1; Part of moringa tree

Part of moringa tree and its activity:

Leaf activity:

Villagers in India and the Philippines combine fatty dishes with fresh moringa leaves to extend their shelf life since these leaves are a good source of natural antioxidants [7]. Clinically, Moringa oleifera leaves are used to treat catarrh, bronchitis, sore throat, headaches, constipation, and flowerpod activity, which are symptoms of an excess of Kapha and the tendency to generate mucus as well as congestion in the sinus and nasal passages, lungs, and colon. Asthma, hyperglycemia, dyslipidemia, influenza, heartburn, syphilis, malaria, pneumonia, diarrhoea, headaches, scurvy, skin conditions, bronchitis, eye and ear infections, and migraines can all be treated with moringa leaves. Also reduces, blood pressure and cholesterol and acts as an anticancer, antimicrobial, Antioxidant, anti diabetic and anti-atherosclerotic agents, neuroprotectant. Moringa leaves contain fiber, fat proteins and minerals like Ca, Mg, P, K, Cu, Fe, and S. Vitamins like Vitamin-A (Beta-carotene), vitamin B-choline, vitamin B1-thiamine, riboflavin, nicotinic acid and ascorbic acid are present. Various amino acids like Arg, His, Lys, Trp, Phe, Thr, Leu, Met, Ile, Val are present. Phytochemicals like tannins, sterols, saponins, trepenoids, phenolics, alkaloids and flavanoids like quercitin, isoquercitin, kaemfericitin, isothiocyanates and glycoside. Calcium builds healthy bones and teeth and assists in blood-clotting. The seasonal effects on calcium content were different. For winter sample, stalk has highest calcium content while the lowest was stem. On the other hand, highest calcium content of Morniga for summer sample was leaf while the lowest was stalk. In Taiwan, the leaves and stems of Moringa are used as vegetables and the stalks are used for soup or stew[8]. The crude protein content (based on wet basis) of Moringa leaves (5.4%) is higher than protein content of alfalfa sprout (3.7%), sweet potato leaves (3.3%), and mung bean sprout. Incorporation of 0.1% extract of MOL (100 mg⁄100 g meat) could protect cooked goat meat patties against lipid oxidation during refrigerated storage. The MOL extract was more effective than BHT in maintaining low TBARS number of precooked chilled goat meat patties[9]. In conclusion, the activity from this study shows the potential value of Moringa oleifera leaf extracts in the management of haemonchosis, since inhibition of egg embryonation, egg hatch and mortality of L1 and L2 larvaeIt is important in reducing pasture contamination thereby helping in the overall helminth control programme [10].

Flowers and pods activity:

The flowers were believed to be beneficial and effective for helping to let go of traumatic memories that obstructed the mind, guilt, emotional wounds and phobias. M. oleifera flowers are said to encourage positive thinking and to renew

the view on life, bringing light to the spirit[11]. The methanol extract of Moringa oleifera flower pods has vast potential as a nutraceutical and a natural substitute to synthetic food preservatives. Further research is necessary for real application of these extracts in food as extrapolation of results from in vitro studies to food products is not straight forward due to complex nature of food and different inter connecting environments [8] A methanol extract of M. oleifera flowers revealed anti-cancer properties by inhibiting growth of PC3 cells (androgen-independent model of prostate cancer) in a dose-dependent manner, while not affecting the viability of normal cells[12]. Moringa pods treat diarrhea, liver and spleen problems, and joint pain. Rich in fiber, lipids, non-structural carbohydrates, protein and ash. Fatty acids like oleic acid, linoleic acid, palmitic acid and linolenic acid are also present. Moringa flowers act as hypocholesterolemic, anti-arthritic agents can cure urinary problems and cold. It contains calcium and potassium and amino acids. They also contain nectar[13].

Seeds activity:

Seeds, collected from pods, can be eaten raw or cooked. From M. oleifera seeds, a rich vegetable oil can be produced. M. oleifera seed oil or Behen/Ben oil is produced through the cold pressing of the M. oleifera seeds. M. oleifera oilcan be used to cook, as a source to prepare biodiesel, as a lubricant and in the cosmetic industry. It is also a good skin cleansing product. Moringa oleifera seeds are clinically used to treat hypertension, neuralgia indicating an excess of Vata, and to treat constipation which belongs to an excess of kapha[12]. Seed powder showed capacity to purify water and remove heavy metals and organic compounds. The oil name comes from its high content on behenic acid, which confers more resistance to oxidative degradation comparing to other vegetable oils. Ben oil is rich in oleic acid (up to 76%), palmitic (6.54%), but also stearic (6%), behenic (7%), and arachidic (4%). It is used in various cosmetic formulations as emollient and confers nourishing, moisturizing, antioxidant and protective properties. Seeds of moringa help in treating hyperthyroidism, Chrohn's disease, antiherpes-simplex virus arthritis, rheumatism, gout, cramp, epilepsy and sexually transmitted diseases, can act as antimicrobial and anti-inflammatory agents. Contains oleic acid (Ben oil), antibiotic called pterygospermin, and fatty acids like Linoleic acid, linolenic acid, behenic acid, Phytochemicals like tannins, saponin, phenolics, phytate, flavanoids, terpenoids and lectins. Apart from these, fats, fiber, proteins, minerals, vitamins like A, B, C and amino acids[13].

Bark activity:

Additionally, the bark possesses antibacterial qualities. Rootbark extracts using ethanol, methanol, and distilled water demonstrated antifungal efficacy against Neurospora crassa and Aspergilus niger. The duration of the mycelial inhibition increased with increasing concentration and lasted for up to 96 hours. In a study using methanol, chloroform, ethyl actetate, and water bark extracts, antibacterial activity was also confirmed. The growth of Staphylococcus aureus, Citrobacter freundii, Bacillus megaterium, and Pseudomonas fluorescens were all suppressed to varying degrees and concentrations. In Ayurvedic Medicine tradition, M. oleifera roots are clinically used to treat epilepsy, hysteria, cardiac diseases, colic and flatulence, as well as anxiety. All these diseases correspond to an excess of Vatta, which force can cause nerve irritation, high blood pressure, flatulence and confusion [12]. Root Bark Root bark acts as a cardiac stimulant, anti-ulcer and anti-inflammatory agent. Alkaloids like morphine, moriginine, minerals like calcium, magnesium and sodium [13].

Nutritive properties:

Every component of M. oleifera contains valuable nutrients and antinutrients. Minerals like calcium, potassium, zinc, magnesium, iron, and copper are abundant in M. oleifera leaves [14]. Vitamins like folic acid, pyridoxine, and nicotinic acid, as well as vitamins C, D, and E, are also present in M. oleifera [15]. Anti-cancerous substances such glucosinolates, isothiocyanates, glycoside compounds, and glycerol-1-9-octadecanoate are present alongside phytochemicals like tannins, sterols, terpenoids, flavonoids, saponins, anthraquinones, alkaloids, and reducing sugar[9]. Additionally, moringa leaves have a low calorie count and can be included in an obese person's diet. The fibrous pods are useful for treating digestive issues and preventing colon cancer [16].

Pharmacological properties:

Anti- inflammatory properties:

The most promising uses of Moringa extract is in the treatment of many types of chronic and acute inflammations. Inflammation can lead to chronic diseases like diabetes, respiratory problems, cardiovascular disease, arthritis, and obesity. Moringa reduces inflammation by suppressing inflammatory enzymes and proteins in the body, and leaf concentrate can significantly lower inflammation in the cells[17].

Anticancer property:

M. oleifera can be used as an anticancer agent as it is natural, reliable and safe, at established con-centrations. Studies have shown that moringa can be used as an anti-neo proliferative agent, thereby inhibiting the growth of cancer cells. Soluble and solvent extracts of leaves have been proven effective as anticancer agents. Furthermore, research

papers suggest that the anti-proliferative effect of cancer maybe due to its ability to induce reactive oxygen species in the cancer cells. Researchs show that the reactive oxygen species induced in the cells leads to apoptosis. This is further proved by the up regulation of caspase 3 and caspase 9, which are part of the apoptotic pathway. Moreover, the ROS production by moringa is specific and targets only cancer cells, making it an ideal anticancer agent[13].

Hepato protective properties:

Moringa play very crucial role to protect liver against damage, oxidation, toxicity due to high concentrations of polyphenols in its leaves and flowers. Moringa oil can also restore liver enzymes to normal levels, reducing oxidative stress, and increasing protein content in the liver. The liver is responsible for blood detoxification, bile production, fructose metabolism, fat metabolism, and nutrient processing, and it can only fulfill these functions with the aid of liver enzymes, so it's vital they stay at normal levels. For instance, lower levels of hepatic enzymes can impair its ability to filter the blood[17].

Antihypertensive properties:

The widespread combination of diuretic along with lipid and blood pressure lowering constituents make this plant highly useful in cardiovascular disorders. Moringa leaf juice is known to have a stabilizing effect on blood pressure. Nitrile, mustard oil glycosides and thiocarbamate glycosides have been isolated from Moringa leaves, which were found to be responsible for the blood pressure lowering effect.

Cholesterol lowering:

Moringa fruit has been found to lower the serum cholesterol, phospholipids, triglycerides, low density lipoprotein (LDL), very low density lipoprotein (VLDL) cholesterol to phospholipid ratio, atherogenic index lipid and reduced the lipid profile of liver, heart and aorta in hypercholesteremic rabbits and increased the excretion of fecal cholesterol. It was recently discovered that the Moringa.

Antifibrotic/ulcer

oleifera seed extract exhibited antifibrotic effects on liver fibrosis in rats, it show significant protective effect against cc14 induced liver fibrosis in rat which was confirmed by histological finding as well as biochemical analysis a marker of collagen deposition in liver known as hydroxyproline treatment with Moringa was found to stimulate hepatoprotective effects against hepatocellular injury by blocking the increase of two serums, Aspartate aminotransferase (AST) and alanine aminotransferase(ALT), which are indicators of liver health conditions [18].

Other activity:

It is good water purifier, also have antioxidant property, it has antifungal antiviral ,and also hveantgibacterial activity. In a study result showed that treatment with Moringaoleifera leave extract restores mono amine levels of brain which may be useful in Alzheimer's disease. Methanolic extract of Moringaoleifera root bark was tested on frog and guinea pig and it shown local anaesthetic activity in both animal models[18].

The psychological and spiritual properties of M. oleifera

Concerning Ayurvedic ancient texts, is mentioned the psychological and spiritual properties of M. oleifera, which is described as powerful herb that penetrates the deep layers of body's tissues and particularly into the bone marrow, which is the deepest tissues of all. Moringa oleifera has a powerful action in purifying the blood, removing impurities, toxins, parasites and metabolic wastes, helping to rejuvenate cells. Moringa oleifera acts and influences at mental, emotional, energetic and spiritual level altogether, having a strong effect in the personality. In terms of influencing the mind, M. oleifera was tested by scientific research, which proved to have anti-depressive and anxiolytic effects, as well considered an adaptogenic and anti-stress herb. Leaves The leaves remarkable nutritional properties, are said to restore self-confidence and address indecisiveness. Ancient ayurvedic physicians also used the leaves to bring clarity and restore the body at deep levels, which both contribute to a feeling of certainty, courage and fearless. Root The roots of the plant are said to be mildly calming and grounding, as is often the case with root medicines. The root is known to enhance feelings of serenity and balanceas well as helping to keep one cantered in times of change or uncertainty[19].

CONCLUSION

The Moringa Oleifera plant is the most affordable and reliable option for both excellent nutrition and the treatment and prevention of many ailments. In India, it would be simple and affordable to nurture and grow moringa trees. In order to fully explore and take use of the benefits of this wonder tree, we must create and develop a strategy on a war footing. The research project ought to be designed for the commercial production of food items, nutraceuticals, edible and cosmetic Moringa oil, enriched cow feed, biogas, and plant fertiliser. Moringa plants for water filtration should be planned. The bioavailability and biotoxicity of nutrients as well as the beneficial effects on the immune system in combating disorders including malnutrition, HIV/AIDS, and sexually transmitted infections should be investigated in

clinical trials using human subjects. Traditional medicine has made claims about the impact of tuberculosis on conditions like diabetes, hypertension, and high blood pressure as well as the effectiveness of antioxidants in preventing conditions like heart disease, cancer, and Alzheimer's disease. Instead of waiting for food aid from the wealthy west, the developing world should encourage the growing and usage of the Moringa tree. Utilizing all of its advantages, Pakistan may easily combat the issues of malnutrition, hunger, poverty, diseases, unemployment, and edible oil export. Instead of spending money on imports, a lot of foreign cash may be made by exporting moringa products. Given its almost endless benefits for humans, the moringa plant should be seen as a high-quality gift from nature that may be purchased for a very modest cost. The discovery of new medicinal compounds may result from further investigation into endophytic fungi and the enzymes or proteins from M. oleifera that are responsible for the anticancer and antidiabetic action. Evaluating M. oleifera's application as a bio-coagulant for commercial purposes is yet another area of focus. It might be a workable substitute for purifying water. Snacks are in high demand on the market. Therefore, adding moringa to snacks to combat malnutrition has two benefits. If the companies and academics take advantage of this potential for extremely nutritious food by conducting additional research to support prior studies, the tree, a native of India, can become a significant source of wealth for the country.

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