

An Overview on *Mangifera Indica*: Importance and Its Various Pharmacological Action

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ABSTRACT

Majority of crude drugs from plant origin are used in Indian system of medicine. Medicinal plants are using as herbal remedies to prevent and cure several ailments differs from community to community. Most studies on the exploitation of mango have been dealing with mango peels, juices and stem bark and mango leaves. *Mangifera indica* (Anacardiaceae), reported to contain active substances like mangiferin. In ayurveda, one of its uses is clearing digestion and acidity. Mangiferin is a pharmacologically active flavonoids, which having the anti bacterial, antioxidant, anticancer, antidiabetes, hepatoprotective, anti inflammatory activities.

Keywords: *Mangifera indica*, Anacardiaceae, Mangiferin, flavonoids

INTRODUCTION

Mangifera indica L. (Anacardiaceae) is one of the important tropical fruits in the world and India contributes major part of the world production. In Indian, Mango is considered as a king of fruits. The different parts of *M. indica* having medicinal uses for throughout the globe. The Mango (*Mangifera indica*) is one of the most important tropical plants^[1]. *Mangifera indica* is a species of mango in the Anacardiaceae family. It is found in the wild in India and cultivated varieties have been introduced to other warm regions of the world. It is the largest fruit-tree in the world, capable of a height of one-hundred feet and an average circumference of twelve to fourteen feet, sometimes reaching twenty. Mangiferin (a pharmacologically active flavonoid, a natural xanthone C-glycoside) is extracted from Mango at high concentrations from the young leaves (172 g/kg), bark (107 g/kg), and from old leaves (94 g/kg)^[2]. In ayurveda, one of its uses is

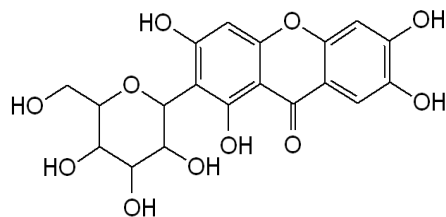
clearing digestion and acidity due to pitta (heat). Mango is one of the most popular of all tropical fruits. Mangiferin, being a polyphenolic antioxidant and a glucosyl xanthone, it has strong antioxidant, anti lipid peroxidation, immunomodulation, cardiotoxic, hypotensive, wound healing, antidegenerative and antidiabetic activities.

Various parts of plant are used as a dentifrice, antiseptic, astringent, diaphoretic, stomachic, vermifuge, tonic, laxative and diuretic and to treat diarrhea, dysentery, anaemia, asthma, bronchitis, cough, hypertension, insomnia, rheumatism, toothache, leucorrhoea, haemorrhage and piles. All parts are used to treat abscesses, broken horn, rabid dog or jackal bite, tumour, snakebite, stings, datura poisoning, heat stroke, miscarriage, anthrax, blisters, wounds in the mouth, tympanitis, colic, diarrhea, glossitis, indigestion, bacillosis, bloody dysentery, liver disorders, excessive urination, tetanus and asthma.

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Taxonomical Classification^[3]

Kingdom	Plantae
Class	Mangoliopsida
Phylum	Mangoliophyta
Order	Sapindales
Family	Anacardiaceae
Genus	Mangifera
Species	Indica



Different Species of mango:

- Mangifera altissima
- Mangifera persiciformis
- Mangifera camptosperma
- Mangifera caesia
- Mangifera decandra
- Mangiferalaurina
- Mangifera odorata
- Mangifera longipes
- Mangifera foetida etc.

Phytochemical constituents of *Mangifera indica* and structure of mangiferin -

Various Chemical constituents are found in different species of mango. These constituents are always of an interest. Especially the polyphenolics, flavonoids, triterpenoids are the different chemical constituents of the plant. Mangiferin is a (xanthone glycoside) major bio-active constituent, isomangiferin, tannins & gallic acid derivatives. The bark is reported to contain protocatechic acid, catechin, mangiferin, alanine, glycine, γ -aminobutyric acid, kinic acid, shikimic acid and the tetracyclic triterpenoids cycloart-24-en-3 β ,26diol, 3-ketodammar-24 (E)-en-20S,26-diol, C-24 epimers of cycloart-25 en 3 β ,24,27-triol and cycloartan-3 β ,24,27-triol. After the isolation of stem bark of mangifera indica, Indicoside A and B, manghopanal, mangoleanone, friedelin, cycloartan-3 β -30-diol and derivatives, mangsterol, manglupenone, mangocoumarin, n-tetacosane, n-heneicosane, n-triacontane and mangiferolic acid methyl ester and others were found^{[3],[4],[5]}.

Structure-

Mangiferin

Formula: C₁₉H₁₈O₁₁

Molar mass: 422.33 g/mol

NUTRITIONAL IMPORTANCE

In Mango fruit, pre-biotic dietary fiber, vitamins, minerals and *poly-phenolic flavonoid* compounds are found. Mango is a very good source of Vitamin-A and flavonoids (*beta-carotene*, *alpha-carotene*, and *beta-cryptoxanthin*). 765 mg of recommended daily levels of vitamin A is present in 100 gm of mango fresh fruit. Together; these compounds are known to have antioxidant properties and are essential for vision. Maintaining healthy mucus membranes and skin vitamin A is required. Consumption of natural fruits rich in carotenes is known to protect body from lung and oral cavity cancers. Fresh mango is a very rich source of potassium. Potassium in an important component of cell and body fluids that helps controlling heart rate and blood pressure. It is also a very good source of vitamin-B6 (pyridoxine), vitamin-C and vitamin-E. Consumption of foods rich in vitamin C helps body develop resistance against infectious agents and scavenge harmful oxygen free radicals. Vitamin B-6 or pyridoxine is required for GABA hormone production in the brain. It also controls homocystiene levels in the blood, which may otherwise be harmful to blood vessels resulting in CAD and stroke. Copper is a co-factor for many vital enzymes, including cytochrome c-oxidase and superoxide dismutase (other minerals function as co-factors for this enzyme are manganese and zinc). Copper is also required for the production of red blood cells. Mango peels are also rich in phytonutrients, such as the pigment antioxidants like carotenoids and polyphenols^[6].

Fresh, Nutrition Value Per 100 G of fresh mango fruit^{[7],[8]}

Sl no.	Principle	Nutrient Value
1	Energy	70 kcal
2	Carbohydrate	17 gm
3	Protein	05gm
4	Total fat	0.27gm
5	Cholesterol	0mg
6	Dietary fibre	1.80gm
7	Vitamine	
	Folate	14µg
	Niacin	0.6mg
	Vit-C	27.7mg
	Vit-A	765IU
	Vit-E	1.12mg
	Vit-K	4.2µg
8	Electrolyte	158mg
9	Minerals	
	Calcium	10mg
	Magnesium	9mg

RECENT PHARMACOLOGICAL ACTIVITY OF *Mangifera indica*

Antibacterial activity:

Pet ether, ethyl acetate, ethanolic extract of *Mangifera indica* showed significant activity against four clinical strains of bacteria *S. typhi*, *B. subtilis*, *E. coli* and *K. pneumoniae*. The standard drug used was amoxicillin 5mg/ml. All solvents extracts at dose range 2mg/ml-4mg/ml showed significant antibacterial activity^[9].

Anti inflammatory activity:

Aqueous extract of leaves of *Mangifera indica* L. Var. Thotapuri for its anti-inflammatory activity. The activity was evaluated by carrageenan induced rat paw edema method for acute inflammation and cotton pellet granuloma method for chronic inflammation. The standard drug used was Diclofenac sodium (10 mg/kg) for both the models. In these methods, ethyl acetate and ethanol extracts at a dose level of

300 mg/kg has shown significant activity which is comparable to that of the standard^[10].

Antioxidant activity:

Several methods have been used to determine antioxidant capacity of plants. Study involved three methods to evaluate the antioxidant activity of the mango seed kernel extract, namely, DPPH radical scavenging activity, ABTS cation radical scavenging activity and ferric thiocyanate assay in comparison to α -tocopherol, ascorbic acid, methyl gallate and tannic acid. The result of the study revealed that the extract has significant anti oxidant activity^[11].

Antiallergic and Anthelmintic activity:

The aqueous extract of stem bark of mango (*Mangifera indica*) having the chemical constituents of vimang and mangiferin. The vimang and mangiferin having the antiallergic and anthelmintic activities. The vimang and mangiferin (500 or 50 mg per kg body weight per day, respectively) administered orally to mice experimentally infected with the nematode, *Trichinella spiralis*. Treatment with Vimang or mangiferin likewise led to a significant decline in serum levels of specific anti-*Trichinella* IgE, throughout the parasite life cycle. Finally, oral treatment of rats with Vimang or mangiferin, daily for 50 days, inhibited mast cell degranulation as evaluated by the passive cutaneous anaphylaxis test (sensitization with infected mouse serum with a high IgE titre, then stimulation with the cytosolic fraction of *T. spiralis* muscle larvae). Since IgE plays a key role in the pathogenesis of allergic diseases, these results suggest that Vimang and mangiferin may be useful in the treatment of diseases of this type^{[12],[13]}.

Hepatoprotective activity:

Three polyphenolic principles, 1,2,3,4,6-penta-O-galloyl- β -D-glucopyranose (PGG), methyl gallate (MG), and gallic acid (GA), were isolated

from the ethanolic extract of seed kernels of Thai mango. evaluating their hepatoprotective potential against liver injury in rats induced by carbon tetrachloride . The result of the study revealed that the extract has significant anti oxidant activity^[14] .

Anticancer activity:

90% methanolic extract of mango leaves extract having antiproliferative effect was preceded by accumulation of cells in G2/M phase of cell cycles. The leaf extracts will be inhibiting AGS cancer cell proliferation in vitro mainly by accumulating cells in G2/M phase .The different concentrations range (62.5-500µg/ml) showed anticancer activity of the leaves extract of mangifera indica^[15] .

Antihyperglycemic activity:

Mangiferin exhibited significant ($P<0.05$) anti-diabetic as well as hypolipidemic effects by lowering FBS, TC, TG, LDL, and VLDL levels; but also with elevation of HDL level in type 2 diabetic model rats. In addition, mangiferin

showed appreciable alpha amylase inhibitory effect (IC₅₀ value 74.35±1.9 µg/ml) and alpha glucosidase inhibitory effect (IC₅₀ 41.88±3.9 µg/ml) when compared with standard drug acarbose (IC₅₀ 83.33±1.2 µg/ml)^[16] .

CONCLUSION

To treat various diseases, different types of herbs are used as a remedy. Traditionally, large number of plant materials is used as a herbal drugs without knowing their pharmacological efficacy. Now a day, remarkable progress going on in medicinal plants research such as chemical characterization, biological, pharmacological, and toxicological estimation. In the present review, highlighted about the various pharmacological activities as well as the nutrition value of Mangifera indica. Futures study on M.indica will help to design multi targeted therapeutic agent. Further research works need to be initiated to look for the possible role of this plant extract and its chemical constituents to variety of diseases in human models.

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