



**MORINGA CONCANENSIS AN EMERGING MEDICINAL PLANT: A
PHYTOPHARMACOLOGICAL REVIEW**

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ABSTRACT

Moringa concanensis Nimmo (Moringaceae) is a traditional medicinal plant, distributed in tropical deciduous forests of India. It is known as kattumurungai in Tamilnadu and Ranshevga in Maharashtra. It has an impressive medicinal use along with a good nutritional value. The aim of this review is to provide an overview of *M. concanensis* i.e. its morphological characteristics, taxonomy, phytochemistry and pharmacological studies. This plant is not edible but it contains wide range of primary and secondary metabolites. The potential constituent present in the plant is phytol which is responsible for its anticancer effect. It also contains alkaloids, flavonoids, tannins, saponins, phenols, carbohydrates, proteins, amino acids and fatty acids. The studies show that *M. concanensis* has anticancer, antioxidant, anticonvulsant, antimicrobial and antifertility effects. Due to the chemical composition, medicinal importance and lack of information; there is a need to develop the further standardization parameters as well as phytochemical investigation using different analytical techniques for its effective identification and authentication.

KEYWORDS: *Moringa concanensis*, Moringaceae, kattumurungai, phytol, antioxidant.

INTRODUCTION

Moringa is a genus which contains approximately 13 species which are cultivated in different regions of Asian and African countries. These species are traditionally used as wound healer or in cough, cold, and diabetes. This genus is also consumed as a food material which has a good nutrient value as well as used for water purification.^[1] Two species of *moringa* out of 13 are cultivated in India i.e. *Moringa oleifera* and *Moringa concanensis*. This review is basically covering all the aspects related to *Moringa concanensis*. The *Moringa concanensis* is a plant belonging to family Moringaceae.^[2]

Taxonomical Classification^[3]

Kingdom: Plantae
Division: Tracheophyta
Class: Magnoliopsida
Order: Brassicales
Family: Moringaceae
Genus: *Moringa*
Species: *Moringa concanensis*

Vernacular Names^[4]

Common name: Konkan Moringa
Hindi: Jangli Sargua, Senjana

Kannada: Nukke, Kadu nukke

Malayalam: Muringa

Marathi: Mashinga, Ran Shevga

Sanskrit: Bahupatraka, Garbhapatka, bahupallava

Tamil: Kattumurungai

Distribution

This plant is cultivated in tropical dry regions of India. It is majorly cultivated in western and southern regions of India. This plant is not edible because of its bitter taste, but it has a variety of uses due to its chemical composition. It is traditionally used as antifertility agent in tribal areas.^[5]

Description

M. concanensis is an evergreen tree with a spreading crown up to 7-8 feet's. Leaves are alternate, 2-3 pinnate, obovate and caduceus. The leaves are somewhat longer than *M. oleifera*. Flowers are large, white, hermaphrodite, and irregular in axillary panicles. Calyx is thinly tomentose, long segments, white, oblong and reflexed. Petals are yellow with red veins and oblong. Stamens are 5 fertile and have 5 staminodes. Capsules are straight, actively triquetrous, slightly constricted between seeds. Seeds are three angled white and pale yellow in colour.^[6]



Figure 1: *Moringa concanensis* tree.



Figure 2: Flowers of *Moringa concanensis*.



Figure 3: Leaves of *Moringa concanensis*.

Traditional Uses

The tribal people use it for eye care, leucorrhoea, thyroid problems, menstrual pain, splenomegaly, jaundice, aphrodisiac, tiredness, high blood pressure, constipation, intestinal worms, diabetes, headache and spinal cord pain. General properties of this plant are similar to *M. oleifera*.^[2]

Phytochemical Studies

The phytochemical studies of methanolic extract of different parts of *M. concanensis* is shown in table 1. The amount of phytoconstituents identified in leaves were higher than seeds and flowers.^[7,8]

Table 1: Phytochemicals present in methanolic extract of different parts of plant.

Sr. No.	Plant part	Phytochemicals
1	Leaves	Alkaloids, Flavanoids, Terpenoids, Phenols, Saponins, Carbohydrates, Proteins and Amino Acids
2	Flowers	Alkaloids, Flavanoids, Terpenoids, Phenols, Saponins, Carbohydrates, Proteins and Amino Acids
3	Seeds	Alkaloids, Flavanoids, Terpenoids, Carbohydrates, Proteins and Amino Acids
4	Bark	Alkaloids, Flavanoids, Terpenoids, Phenols, Saponins, Tannins, Carbohydrates, Proteins and Amino Acids

Table 2: Content of specific metabolites in different parts of plant.

Sr. No.	Parts	Phytochemicals (W/W)			
		Alkaloids	Flavanoids	Phenols	Carbohydrates
1	Leaves	5.92	15.74	37.52	9.15
2	Flowers	4.37	15.12	30.18	7.49
3	Seeds	2.15	10.08	-	5.86

From the GC-MS studies the active chemical constituents identified from the species are; 1, 2-15, 16-Diepoxyhexadecane, Butanoic acid, 3- Cyano-3-Hydroxy-Ethyl ester, N- Hexadecanoic acid, Phytol, Tetratetracontane, 2- [3- (4- Tert-butyl-phenoxy)-2-hydroxy-propylsulfanyl]-4, 6-Dimethyl NI, Acetamide, N-(6-Acetylamino benzothiazol-2-yl)-2-(Adamantan-1-yl), 2-Methyl Nonadecane.^[9]

Pharmacological Studies

Antioxidant activity

The methanol and acetone extracts of root bark of *M. concanensis* was assessed for antioxidant activity. The activity was carried out using different chemical assays methods like free radical scavenging (DPPH), metal chelating and bleaching inhibition. The methanolic extract of root bark was found to be more potent in its antioxidant and free radical scavenging activity due to high phenol content than acetone extract.^[10]

The antioxidant activity was also evaluated in ethanolic and water extract of fresh and dried flowers of *M. concanensis*. The activity was assayed using DPPH (1, 1-diphenyl-2-picrylhydrazyl) free radical scavenging assay. The ethanolic extract of fresh flowers shows greater activity than water extract while the dried flowers shows greater DPPH scavenging activity in water extract compared to ethanolic extract.^[11]

Anticancer activity

The anticancer activity of ethanolic extract of leaf and bark was examined on Hep-G2 cells. The activity was assessed by using MTT [3-(4,5-dimethylthiazol-2-yl)-2, 5- diphenyltertrazolium bromide] assay. The extracts inhibit the proliferation of hepatic cell carcinoma (Hep-

G2) by regulating caspase 9 and caspase 3 in intrinsic pathway while reducing the potential of mitochondrial membrane of cells. The anticancer activity of *M. concanensis* is due to presence of phytol. The maximum inhibition of cell growth was up to 93.7 % with IC₅₀ at 100 µg/ml in leaf extract while it is 93.44 % with IC₅₀ at 100 µg/ml in bark extract. So, the study revealed that the methanolic extract of leaf showed more anticancer potency than the bark extract.^[12]

The methanolic extract of leaves of *M. concanensis* was studied for anticancer activity on the breast cancer cells i.e. MCF-7 cell line and by MTT assay. The maximum inhibition of cell growth observed was 47.16 ± 2% at 200 µg/ml concentration with 208µg/ml of IC₅₀ value. The result showed the anticancer potential of methanolic extract of leaves of *M. concanensis*.^[13]

Anticonvulsant effect

The ethanolic extract of leaves of *M. concanensis* was evaluated for its anticonvulsant effect on maximal electroshock-induced seizures (MES) and pentylenetetrazole (PTZ)-induced seizures in Swiss albino mice. MES- and PTZ-induced convulsions are associated with oxidative damage. The ethanolic extract of the leaves of *M. concanensis* (200 mg/kg) significantly abolished the hind limb extension induced by MES and at the same dose significantly protected the animals from PTZ-induced tonic convulsions. The anti-convulsant activity of *Moringa concanensis* was due to the antioxidant property. The activity may be due to the presence of various phytoconstituents like alkaloids, tannins, phenols, flavanoids, and carbohydrates.^[14]

Antimicrobial activity

The ethanolic extract of leaves of four different plant species like; *Andrographis lineata*, *M. concanensis*, *Hugonia mystax* and *Curcuma neilgherrensis* were tested for antimicrobial effect against three different strains of bacteria like; *Escherichia coli*, *Kleibseilla pneumoniae* and *Pseudomonas aeruginosa*. The *M. concanensis* recorded activity index in comparison of zone of inhibition with ciprofloxacin i.e. 0.47, 0.52 and 0.57 for *E. coli*, *K. pneumoniae* and *P. aeruginosa* respectively. *M. concanensis* with *Hugonia mystax* and *Curcuma neilgherrensis* showed a synergistic effect with better activity against *E. coli*, *P. aeruginosa* and *K. pneumoniae* than tested alone against bacteria.^[15]

The antimicrobial activity of various extracts of bark of *M. concanensis* was assessed by cup diffusion method by measuring zone of inhibition. The study was done by using various bacterial strains like *Pseudomonas*, *Staphylococcus*, *Bacillus*, *Vibrio cholera*, *Escherichia coli*, *Lactobacillus brevis*, *Lactobacillus bulgaricus*, *Micrococcus luteus* and *Proteus vulgaris*. The results showed the considerable antimicrobial activity in ethanol, chloroform, acetone and aqueous extract.^[16]

The antifungal activity of various extracts of bark of *M. concanensis* was done by disc diffusion method by measuring zone of inhibition. The antifungal activity was assessed by using various fungi like *A. flavus*, *A. niger*, *A.oryzae*, *A. sojae* and *C. albicans*. The ethanol, chloroform, acetone and aqueous extract bark of *M. concanensis* showed considerable antifungal activity.^[16]

Antifertility activity

The hydroalcoholic extract of *M. concanensis* was evaluated for anti-implantation, abortifacient, estrogenic and antiestrogenic activity. The extract showed potent anti-implantation and abortifacient activity at 200 mg/kg and 400 mg/Kg respectively and marked estrogenic activity. The antifertility activity of *M. concanensis* was due to the presence of alkaloids, terpenoids, steroids and flavonoids.^[17]

Anti-inflammatory activity

The ethanolic extract of flowers of *M. concanensis* was assessed for its anti-inflammatory activity in carrageenan-induced rat paw oedema in albino rats. The Indomethacin was used as reference standard. The inflammation induced by carrageenan was due to cyclooxygenase. The inhibition of inflammation by flavonoids present in *M. concanensis* leads to reduced secretion of prostaglandins.^[18,19]

Antipyretic activity

The antipyretic activity of ethanolic extract of flowers was evaluated. The albino rats were injected subcutaneously with dried brewer's yeast aqueous suspension to develop the pyrexia. Paracetamol was used as reference standard. The plant extract decreased temperature up to 2.190° C at a dose of 200 mg/kg due to

presence of certain components like; alkaloids, carbohydrates, flavonoids, fixed oils, phytosterols and fats.^[18,19]

Analgesic activity

The ethanolic extract of fruits of *M. concanensis* was assessed for its analgesic activity. The extract at the dose levels of 200 and 400 mg/kg, was administered orally, once daily for 3 days for evaluation of the analgesic activity. The activity was done by analgesy-meter-induced pain, acetic acid-induced writhing and reaction time in the hot plate test. The extract produced significant analgesic activity due to presence of alkaloids, flavonoids, fats, fixed oils, phytosterols and carbohydrates.^[18,20]

DISCUSSION

The literature study has widely explained the efficiency of *M. concanensis* as traditional herbal medicine. The chemical constituents like alkaloids, flavonoids, phenols, tannins, carbohydrates are responsible for various medicinal activities like antioxidant, antimicrobial, anticancer, anticonvulsant, anti-inflammatory, analgesic, antipyretic and antifertility. Although very less studies have been conducted on *M. concanensis* further studies still need to be done.

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