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Review Article

**POTENTIAL PHARMACOLOGICAL APPLICATION OF
Morus alba: A REVIEW**¹Jyothi B N *, ²Dr. Kiran K J , ³Mrs. Sanitha M , ⁴Mr. Shabin P, ⁵Dr. Prasobh G R^{1,4} Third Semester, M Pharm, Department of Pharmacology, Sree Krishna college of Pharmacy and Research Centre Parassala, Thiruvananthapuram.²Professor and Vice Principal, Department of Pharmacology, Sree Krishna college of Pharmacy and Research Centre Parassala, Thiruvananthapuram.³Assistant Professor, Department of Pharmacology, Sree Krishna College of Pharmacy and Research Centre Parassala, Thiruvananthapuram.⁵Principal, Sree Krishna College of Pharmacy and Research Centre Parassala, Thiruvananthapuram.**Abstract:**

Morus alba (M. alba), also known as white mulberry, belongs to the Moraceae family. It has long been used commonly in Ayurvedic and many of traditional systems of medicine. Medicinally, whole plants, leaves, fruits, branches, and roots have been employed. The present paper gives an account of updated information on its Phytochemicals and Pharmacological activities. The plant contained tannins, steroids, phytosterols, sitosterol, glycosides, alkaloids, carbohydrates, proteins, and amino acids, as well as saponins, triterpenes, phenolics, flavonoids, benzofuran derivatives, anthocyanins, anthraquinones, glycosides, vitamins, and minerals. The review reveals the wide range of important Pharmacological activities including antidiabetic, antimicrobial, antioxidant, anticancer, anxiolytic, anthelmintic, antistress, immunomodulatory, nephroprotective, hepatoprotective actions. This study looked at Morus alba's traditional uses, chemical components, and pharmacological effects.

Keywords: Antioxidants, Antimicrobials, Immunomodulatory, Morus alba, Nephroprotective,

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INTRODUCTION:

Morus alba (*M. alba*), also known as white mulberry, belongs to the Moraceae family. [1] It is a small deciduous tree cultivated in various tropical, subtropical, and temperate countries, including China, Japan, Korea, Thailand, Indonesia, India, Vietnam, Brazil, Africa, and others. Many traditional medicines incorporate *M. alba* fruit, leaves, roots, branches, and bark in Ayurveda medication systems due to their health benefits and antioxidants. [2]

In recent decades, the field of medicinal herbs has grown rapidly. Because of their natural origins and negligible side effects, they are gaining appeal in both developing and developed countries. Plants are often secondary sources of compounds used as medications, insecticides, perfumes, colorants, biopesticides, and food additives since they are biosynthetically produced from primary metabolites. Analgesics, anti-rheumatic agents, diuretics, hypoglycaemic agents, insecticides, antibacterial agents, laxatives, tonics, antihypertensive agents, and sedatives are among the many uses of *Moraceae* fruits. [3]



Fig .1: *Morus alba*

M. alba contains abundant bioactive compounds, including phenolic acids, flavonoids, flavanols, anthocyanins, macronutrients, vitamins, minerals, and volatile aromatic compounds. [4,5] Its fruits and leaves contain significant amounts of quercetin, rutin, and apigenin, ferulic, chlorogenic, and protocatechuic acids are also the significant compounds in fruits. These natural bioactive compounds hold potent biological activities proven to exhibit excellent pharmacological effects against various diseases. *Morus alba* is a moderately sized tree, three to six meters high. White mulberry is cultivated throughout the world, wherever silkworms are raised. The leaves of white

mulberry are the main food source for the silkworms. [6]

TAXONOMIC CLASSIFICATION

Kingdom	: Plantae – Plants
Subkingdom	: Tracheobionta – Vascular plants
Superdivision	: Spermatophyta – Seed plants
Division	: Magnoliophyta – Flowering plants
Class	: Magnoliopsida – Dicotyledons
Subclass	: Hamamelididae
Order	: Urticales
Family	: Moraceae– Mulberry family
Genus	: <i>Morus</i> L. – mulberry
Species	: <i>Morus alba</i> L – white mulberry

COMMON NAMES

Afrikaans: gewone moerbeï, witmoerbeï Arabic: Tiki, tut abiadh
 Chinese: sang
 English: Russian mulberry, silkworm mulberry, white mulberry French: murier blanc
 Indian: hip nerle, reshme chattu, kamblichedi, musukette, ambat, chinni German: weißer Maulbeerbaum
 Italian: Gelso bianco, moral blanco, morera blanco
 Japanese: kuwa
 Portuguese: amoreira-branca Russian: šelkoviča belaja
 Spanish: mora, moral blanco, morera blanca Swedish: vitt mullbär

DESCRIPTION

Morus alba is a fast-growing shrub or medium-sized tree with a straight, cylindrical trunk that measures 1.8 m in circumference without buttresses. The bark is dark greyish brown in colour, with longitudinal cracks and a rough surface, while the latex is white or yellowish white. [7] The stem is lateral, scaly, and coral, with two rows of oval or nearly oval leaves, and a simple trilobal, dentate, and palm with three veins at the base. The flowers are greenish in colour and have four free scale-like petals. Four stamens, pistil shape; male and loose flowers of racemes like catkins. Female flowers with long or short spikes; ovarian obstruction, 1- (2-) chamber, single ovule, two styles; fan-shaped with ovules and one ovule. A fan shape that contains the ovaries and has one ovule. Ovarian syncarpous fruit with some drupes surrounded by fleshy perianths up to 5 cm in length.

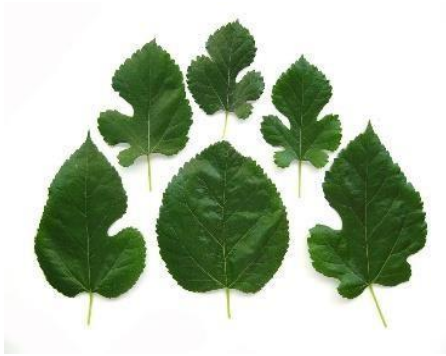


Fig.3: *Morus alba* leaves



Fig.4: Whitish fruit-clusters of *Morus alba*



Fig.5: *Morus alba* stem



Fig.6: White mulberry catkins



Fig.7: White mulberry root

HABITAT

Morus alba is native of India, China and Japan. It is occasionally cultivated elsewhere in Europe, North America, and Africa. *Morus alba* is commonly known as white mulberry. White mulberry is cultivated throughout the world, wherever silkworms are raised. The leaves of white mulberry are the main food source for the silkworms.^[6]

PHYTOCHEMICAL REVIEW

The plant contained tannins, steroids, phytosterols, sitosterol, glycosides, alkaloids, carbohydrates, proteins, and amino acids, as well as saponins, triterpenes, phenolics, flavonoids, benzo furan derivatives, anthocyanins, anthraquinones, glycosides, vitamins, and minerals. It is a very good source of ascorbic acid, of which over 90% is present in a reduced form, and also contains carotene, Vitamin B1, folic acid, folinic acid, isoquercetin, and quercetin, which act as a good source of natural antioxidants. White mulberry leaf contains triterpenes (lupeol) Sterols (β Sitosterol), bioflavonoids (rutin, moracetin, quercetin-3-triglucoside and isoquercitrin), coumarins, volatile oil, alkaloids, amino acids and organic acids. *Morus alba* leaves contain rutin, quercetin and apigenin as bioactive constituents.^[8] The one of major constituent of *Morus alba* is 1-deoxynojirimycin.^[9] *Morus alba* leaf extract has been found to produce nitric acid, prostaglandin E2 and cytokines in macrophages.

NUTRIENT COMPOSITION OF *Morus alba*

People consume mulberry species in various countries due to their nutritiousness, deliciousness, nontoxicity, and abundant active benefits. The leaves of *M. alba* species are rich in protein, carbohydrates, Fiber, and vitamins, especially ascorbic acid and carotene. Studies have also found that the leaves contain a high amount of important minerals such as calcium (Ca), potassium (K), magnesium (Mg), zinc (Zn), and many others. *M. alba* leaves possessed high iron (Fe) values (119.3–241.8 mg/kg) and a low level of sodium (0.01 mg/100 g), making them a suitable diet material for sodium-restricted individuals. The leaves also contain a considerable amount of organic acids, including citric acid (0.26–3.85 mg/g FW), malic acid (7.37–12.49 mg/g FW), tartaric acid (0.085–0.212 mg/g FW), succinic acid (1.02–5.67 mg/g FW), lactic acid (0.29–0.83 mg/g FW), fumaric acid (0.058–0.39 mg/g FW), and acetic acid (0.029–0.1 mg/g FW), which contribute to the potential health benefits of *M. alba* leaves.^[10]

USES

The fruits have been used as analgesics,

anthelmintics, antibacterial agents, anti-rheumatic agents, diuretics, antihypertensive agents, hypoglycaemic agents, laxatives, tonics, and sedatives. The fruits can also be utilized as tonics for the liver and kidneys, as well as hematopoietic stimulants. Cooling, sedation, diuresis, tonicity, convergence, and neuropathy have all been treated with the roots of this plant. Twigs have been utilized as a neurotoxic and an anti-rheumatic medication. The leaves have traditionally been employed as a sweat inducer, a cooling agent, and an antipyretic. Fruits were employed in traditional herbal therapy as repellents and to treat perspiration, hypertension, throat rinses, fever, and eye disorders caused by irritation of the upper respiratory tract. Root extracts have long been used as anti-inflammatory, analgesic, and protective agents in the liver and kidney systems.^[3]

PHARMACOLOGICAL EFFECTS**Antidiabetic:**

Morus alba were studied for the starch breakdown by α -amylase in vitro *Morus alba* [IC50=17.60 (17.39-17.80) mg/ml] revealed appreciable α -amylase inhibitory activities in a concentration dependent manner. In another study the 50% methanolic extract of *Morus alba* was tested for its in-vitro acetylcholine esterase inhibitory activity using modified Ellmann's method. The crude methanolic extract showed acetylcholine esterase inhibitory activity in a concentration dependent manner and around 10 μ g of the extract was required for 50% inhibition of the activity.

Antistress:

The ethyl acetate-soluble fraction of methanol extract of *Morus alba* roots was subjected to evaluate the adaptogenic property against a rat model of chronic stress (CS). Pre-treatments with the ethyl acetate soluble fraction of methanol extract of *Morus alba* roots (25, 50 and 100 mg/kg, p.o.) significantly attenuated the CS-induced perturbations. The results indicate that *Morus alba* possesses significant adaptogenic activity, indicating its possible clinical utility as an antistress agent.

Anthelmintic:

Petroleum ether, chloroform and methanol sequential leaf extracts of *Morus alba* at Different concentrations were tested for anthelmintic capacity by the determination of time of paralysis and death of Indian earthworms, *Pheretima Posthuma*. Albendazole was used as the standard all the extracts showed dose dependent effects and comparable to standard drug Albendazole

Anticancer:

In a study antiproliferative properties of different parts of mulberry were determined. The

antiproliferative effect of the methanol extracts of mulberry leaves on the cell lines Calu-6 (human pulmonary carcinoma), MCF-7 (human breast adenocarcinoma) and HCT-116 (human colon carcinoma) was different and connected to the concentrations of the investigated extracts. The fermentation of the mulberry leaves did increase their methanol extract antiproliferative effect only on human gastric carcinoma (SNU-601) cell line in concentration of 1,000 mg mL.

Antioxidant activity:

The antioxidant activity of leaf extracts was evaluated by measuring 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, 2,2'-azino-bis-(3-ethylbenzthiazoline-6-sulphonic acid (ABTS) radical cation scavenging capacity and ferric ion reducing power and values ranged between 1.89–2.12, 6.12–9.89 and 0.56–0.97 mM Trolox equivalent/g of dried leaves, respectively. The investigated features reveal good antioxidant attributes significantly.

Antimicrobial:

Heat Stable Proteins of *Morus alba* tested for the antibacterial activity against *Escherichia coli*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Bacillus subtilis* and compared with the antibiotic chloramphenicol, Area of zone of inhibition increased with the increase in the concentration of the Heat Stable Proteins for all the microbes tested by the mulberry varieties. For *Escherichia coli* MIC was at 25 µl by *Morus alba* was more effective against *E. coli* at 100µl.

Anxiolytic:

The anxiolytic effect of a methanolic extract of *Morus alba* leaves in mice was study by using the hole-board test; elevated plus-maze paradigm; open field test and light/dark paradigm were used to assess the anxiolytic activity. *Morus alba* extract at different doses and diazepam as standard were administered 30 min before the tests. The results showed that the methanolic extract of *Morus alba* significantly increased the number and duration of head poking in the hole-board test. In the elevated plus-maze, the extract significantly increased the exploration of the open arm in similar way to that of diazepam.

Immunomodulatory:

The effect of *Morus alba* on the immune system was evaluated by using different experimental models such as carbon clearance test, cyclophosphamide induced neutropenia, neutrophil adhesion test, effect on serum immunoglobulins, mice lethality test and indirect haemagglutination test. *Ocimum sanctum* was used as standard drug. *Morus alba* extract in different doses increased the levels of serum

immunoglobulin and prevented the mortality induced by bovine *Pasteurella multocida* in mice.

Nephroprotective:

A study was designed to investigate the nephroprotective effect of hydroalcoholic extract and flavonoid fraction of *Morus alba* leaves on cisplatin-induced nephrotoxicity in rats. Male rats were used in this study. Study involved the serum concentrations of blood urea nitrogen (BUN), creatinine (Cr) and nitric oxide testing using standard methods. Also left kidneys were prepared for pathological study. Hydroalcoholic extract was ineffective in reversing the alterations but flavonoid fraction significantly inhibited CP-induced increases of blood urea nitrogen and creatinine.

Hepatoprotective Effect:

The crude hydroalcoholic extract of *Morus alba* leaves was evaluated for hepatoprotection against hepatotoxicity induced by carbon tetrachloride. The hydroalcoholic extract at dose of 800mg/kg exhibited a significant liver protective effect by lowering the serum levels of aspartate aminotransferase (AST) and alanine aminotransferase (ALT), decreasing the sleeping time and resulting in less pronounced destruction of the liver, there was no fibrosis and inflammation.^[11]

CONCLUSION:

It is a fact that human life cannot exist without nature. The present study confirms that *Morus alba*, a plant used in traditional medicine for centuries, possesses a rich phytochemical profile and exhibits a range of pharmacological activities. The presence of flavonoids, alkaloids, phenolic acids, and other bioactive compounds contributes to its antioxidant, anti-inflammatory, antimicrobial, and hypoglycaemic properties. It is look for the appropriation that this review will pay special attention toward the therapeutical capabilities, uses and in vast studies of Phytochemical and Pharmacological features of *Morus alba*. Overall, this study provides scientific validation for the traditional uses of *Morus alba* and highlights its potential as a source of natural therapeutics for various diseases.

REFERENCES:

1. MaryamFatima, Mudasir A. Dar, Maruti J. Dhanavade, Syed Zaghum Abbas Abdullah Arsalan, MohdNadeemBukhari, Yangzhen Liao, Jingqiong Wan, Jehangir Shah Syed Bukhari and Zhen Ouyang. Biosynthesis and Pharmacological Activities of the Bioactive Compounds of White Mulberry (*Morus alba*). *Journal of Experimental Pharmacology*.2024;2-26.

2. Xie, H.-H.; Wei, J.-G.; Liu, F.; Pan, X.-H.; Yang, X.-B. First report of mulberry root rot caused by *Lasiodiplodia theobromae* in China. *Plant Dis.* 2014, 98, 1581.
3. Gaber El-saber Batiha, Ali Esmail Al-Snafi, Mahdi M Thuwaini et al. *Morus Alba* : a comprehensive phytochemical and pharmacological review. *Journal of Experimental Pharmacology* .2023;1-9.
4. Sánchez-Salcedo, E.M.; Mena, P.; García-Viguera, C.; Hernández, F.; Martínez, J.J. (Poly) phenolic compounds and antioxidant activity of white (*Morus alba*) and black (*Morus nigra*) mulberry leaves: Their potential for new products rich in phytochemicals. *J. Funct. Foods* 2015, 18, 1039–1046.
5. Sánchez-Salcedo, E.M.; Mena, P.; García-Viguera, C.; Martínez, J.J.; Hernández, F. Phytochemical evaluation of white (*Morus alba* L.) and black (*Morus nigra* L.) mulberry fruits, a starting point for the assessment of their beneficial properties. *J. Funct. Foods* 2015, 12, 399–408.
6. Anonymous. *The Wealth of India, A Dictionary of Indian Raw materials*. Vol. 7. New Delhi: Council of Scientific and Industrial Research; 1952. p. 429-37.
7. <http://plants.usda.gov>
8. Doi K, Kojima T, Makino M, Kimura Y and Fujimoto Y. Studies on the constituents of the leaves of *Morus alba* L. *Chem Pharm Bull* 2001; 49:151-53.
9. Kim HM, Han SB, Lee KH, Lee CW, Kim CY, Lee EJ et al. Immunomodulating Activity of a Polysaccharide Isolated from *Mori Cortex Radicis*. *Arch Pharm Res* 2000; 23:240-242.
10. Centhya Chen, UmiHartina MohamadRazali , Fiffy Hanisdah Saikim , Azniza Mahyudin and Nor Qhairul Izzreen Mohd Noor, *Morus alba* L. Plant: Bioactive Compounds and Potential as a Functional Food Ingredient, multidisciplinary digital publishing institute, 2021; 10:689,3-28.
11. Bandna Devi, Neha sharma, Dinesh Kumar, Jeet, *Morus alba* Linn: A Phytopharmacological Review, *International Journal of Pharmacy and Pharmaceutical Sciences*, 2013;5: 14-18.