

A LACONIC APPRAISE OF PHARMACOLOGICAL AND PHYTOCHEMICAL ASPECTS OF INDIAN DEVIL TREE - *ALSTONIA SCHOLARIS* (L.) R.BR.

Lakha Ram¹, Sukhraj Punar², Ashok K. Kakodia³, Bina Rani⁴, Upma Singh⁵ and Raaz K. Maheshwari*²

¹Department of Chemistry, JNMP Govt PG College, Phalodi, Jodhpur (Rajasthan), India.

²Department of Chemistry, SBRM Govt PG College, Nagaur (Rajasthan), India.

³Department of Chemistry, SGG Govt PG College, Banswara (Rajasthan), India.

⁴Department of Applied Sciences & Humanities, IIMT College of Engineering, Greater Noida, Gautam Buddha Nagar (U.P.), India.

⁵Department of Applied Chemistry, School of Vocational Studies & Applied Sciences, Gautam Buddha University, Greater Noida, Gautam Buddha Nagar (U.P.), India.

Received on: 21/09/2020

Revised on: 11/10/2020

Accepted on: 31/10/2020

*Corresponding Author

Raaz K. Maheshwari

Department of Chemistry,
SBRM Govt PG College,
Nagaur, Rajasthan, India.

ABSTRACT

The decoction, mostly prepared from the bark, is used to treat a variety of diseases, of which the most important is malaria. In Ayurveda, it is used as a bitter and as an astringent herb for treating skin disorders, malarial fever, urticaria, chronic dysentery, diarrhea, and in snake bite. Alkaloids such as chlorogenic acid and several other hallucinogenic indole alkaloids which have been reported in the seeds of *A. scholaris* are chlorogenine, alstovenine, reserpine, echitamine, ditamine, and venenatine. 7-megastigmene-3, 6, 9-triol and megastigmene-3 β , 4 α , 9-triol are the two important structures which have been identified and were extracted from the leaves of *A. scholaris* and are known to be C13-norisoprenoids. Alstonic acids such as 2, 3-secofermane triterpenoids were also found to be isolated from leaves of *A. scholaris*. The plant *Alstonia scholaris* has been used in different system of traditional medication for the treatment of diseases and ailments of human beings. It is reported to contain various types of alkaloids, steroids, triterpenoids, flavonoids and phenolic acids. *A. scholaris* is also observed to possess antioxidant, immunomodulatory effects, and free radical scavenging, anti-inflammatory, antimutagenic, anticancer, analgesic, hepatoprotective, wound healing, antidiarrheal, and antiplasmodial activities. The current review summarizes the phytochemical and pharmacological delineation on *A. scholaris*.

KEYWORDS: Immunomodulatory, Hepatoprotective, anti-inflammatory, antimutagenic, Chemical constituents.

INTRODUCTION

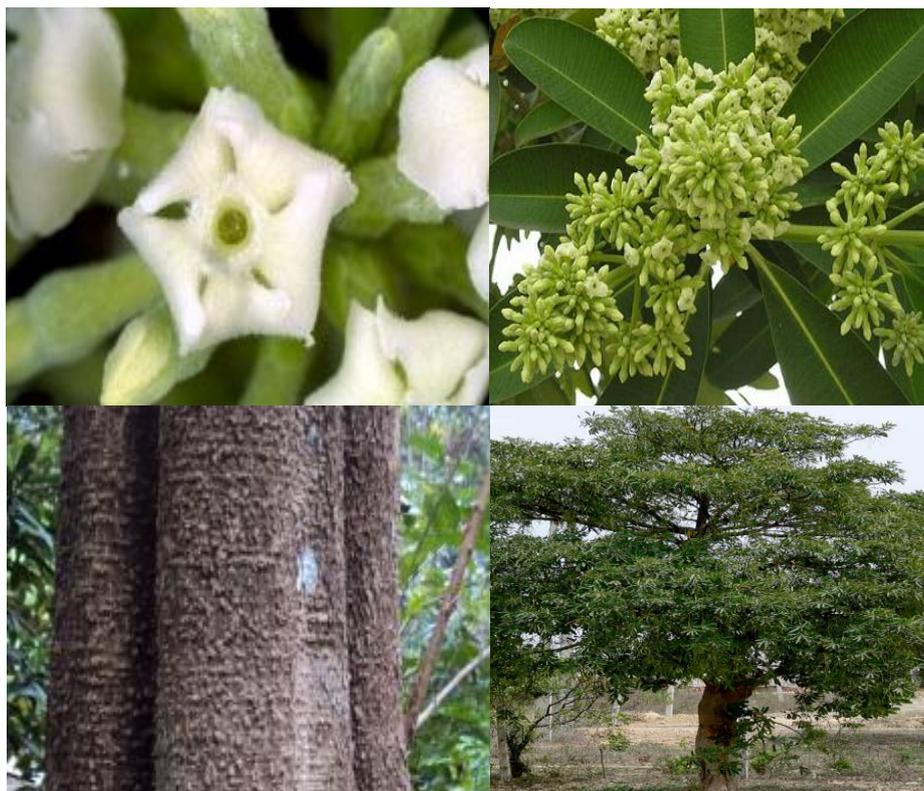
Indian devil tree scientifically known as *Alstonia scholaris* is an evergreen tropical tree in the family Apocynaceae. The plant is native to the lowland and mountain rainforests of Indian subcontinent, Malay Peninsula, and Australasia. The plant grows throughout the humid regions of India, especially in West Bengal and west-coast forests of south India.

Alstonia scholaris is an important medicinal plant in the various folk and traditional systems of medicine in Asia, Australia, and Africa. The plant is used in Ayurvedic, Unani, and Siddha types of alternative medicinal systems.^[1-7] Few of the popular common names of the plants are blackboard tree, devil tree, ditabark, milkwood-pine, saptarni, shaitan tree, white cheesewood, Milky Pine, Djetutung, White Pine, Palmira *Alstonia*, Pine, Milky, Pulai, Jelutong, Australian fever bark tree, Australian quinine bark tree, bitter-bark tree,

blackboard tree, chatiyan wood, shaitan, chattun, chatian, chhatiwan, chatiwan, tin pet, dita, khaaniqat al-kalab, shajaratah fi asya al-harrah, scholarsi, may man, mò cua and mùa cua. It has long being used as a traditional medicine to cure various human and livestock ailments.^[8-10] The plant is used in Ayurvedic, Unani and Siddha/Tamil types of alternative medicinal systems. The plant is traditionally being used in debility, arthritis, diabetes, ulcer, stomachache, malarial fever, pimple, dental care importance), wounds and earache, asthma, dog bite, fever, cancer, tumour, jaundice, hepatitis, malaria, skin diseases, diarrhea, leprosy, mental disorders, cardiopathy, helminthiasis, pruritus, agalactia, hypertension, dental or gum problem, abdominal pain after delivery and swelling. It is also used as aphrodisiac, antidote to poison, abortifacient, astringent, thermogenic, cardiogenic, stomachic and expectorant. It is reported to contain various types of alkaloids, steroids, triterpenoids, flavonoids and phenolic acids.^[11-14] *Alstonia scholaris*

has been reported as antimicrobial, anti-cancer, anti-inflammatory, analgesic, antioxidant, antifertility and

wound healing activities.^[15]



The latex is used to clean wounds and can be used for chewing gum. The wood is too soft for making anything – so it is usually used in making packing boxes, blackboards etc. *Alstonia scholaris* tree has been used to make paper. The ripe fruits of the plant are used in syphilis and epilepsy. The milky juice of *Alstonia scholaris* has been applied to treat ulcers. The bark of the *Alstonia scholaris* is used in Ayurvedic medicine to treat fever, malaria, troubles in digestion, tumors, ulcers, asthma, and so forth. The leaves and the latex are applied externally to treat tumors. The bark and roots are boiled with rice and eaten by girls daily for several weeks to treat excessive vaginal discharge.^[16-18] The dried leaves of the *Alstonia scholaris* are used as an expectorant. The roots and bark are used in traditional medicine as an anthelmintic, astringent tonic, alterative, antiarrhoeaticum, antiperiodicum etc. The latex is used to clean wounds and can be used for chewing gum. The leaves can be used to treat skin diseases. The wood is too soft for making anything – so it is usually used in making packing boxes, blackboards etc. *Alstonia scholaris* tree has been used to make paper.^[19-21]

Phytochemical Aspects

Various alkaloids that have been reported in stem bark of *A. scholaris* includes alstonidine, O-methylmacralstonine, macralstonine O-acetylmacralstonine, alstonine, ditamine, echicaoutchin, corialstonidine, corialstonine chlorogenine, villalstonine, pleiocarpamine, macrocarpamine, and triterpenoids

which have been reported are alpha-amyrin linoleate, lupeol palmitate, and lupeol linoleate. There have been several other alkaloids that had been isolated and reported which are 12-methoxyechitamine, 5-epinarelone ethyl ether, nareline methyl ether, scholaricine, picrinine, and scholarine-N(4)oxide, 19-hydroxytubotaiwine, 6,7-seco-19,20-epoxyyanggustibobine B, Nb-methyl-scholarine, Namethylburnamine, 19-episolarine and vallesamine Nb-oxide, 19,20-[E]-vallesamine, angustilobine, 20(S)-tubotaiwine, B-N4-oxide, and 6,7-secoangustilobine.^[22-25] Leaves of *A. scholaris* have been the source of new picrinine - types of monoterpenoid indole alkaloids which are 5-methoxystrictamine, picralinal, and 5-methoxyaspidothylline.^[26-29] Alkaloids such as ditamine, echitamine, and echitenine obtained from bark of *A. scholaris* are yellow-colored amorphous mass. Acicular crystals form of echicerin and crystallized scales of echitin have been reported from bark extract. Alkaloids such as chlorogenic acid and several other hallucinogenic indole alkaloids which have been reported in the seeds of *A. scholaris* are chlorogenine, alstovenine, reserpine, echitamine, ditamine, and venenatine. 7-megastigmene-3, 6, 9-triol and megastigmane-3 β , 4 α , 9-triol are the two important structures which have been identified and were extracted from the leaves of *A. scholaris* and are known to be C13-norisoprenoids. Alstonic acids such as 2, 3-secofernane triterpenoids were also found to be isolated from leaves of *A. scholaris*.^[26-29]

Traditional Uses

The herb is a substitute for quinine and cinchona. It is used widely for treating the problem of intermittent and remittent fevers. An infusion created from the extracts from the bark of the tree is known to cure malarial fever.^[30-32] The plant is effective in cases of chronic dysentery and diarrhea. The extract from the tree of *Alstonia scholaris* is helpful in treating acne, ringworm and eczema. The bark powder is used to cure pain in the abdomen and lumps. The twigs of the tree are used as a toothbrush because of its bactericidal properties. The *Alstonia scholaris* is used to improve appetite of new mothers. The plant increases lactation in new mothers. The paste of the bark of the evergreen tree is applied to cure chronic arthritis. The powder of the flower of the *Alstonia scholaris* is used in case of headaches.^[33-35] The roasted leaves of the tree is made into a poultice and used as a stimulant on ulcers. This herb is also prescribed for curing leprosy. The juice of the bark is used to cure sores, tooth pains, ulcers and rheumatism. The fruits of the tree cure insanity as well as epilepsy. The leaf extract have antimicrobial properties while the alcoholic extract from the stem bark showed anticancer activity. The antimicrobial property of the plant constitutes of *A. scholaris* (alkanes, alkanols and sterols). Evaluated the antibacterial activity of the petrol, dichloromethane, ethyl acetate, butanol fractions of crude methanolic extracts of the leaves, stem and root barks of *Alstonia scholaris* and reported that butanol fractions exhibited broader spectrum of antibacterial activity.^[36-37]

CONCLUSION

The plant *Alstonia scholaris* has a wide range of pharmacological activities and many isolated compounds. Plants, which are used in traditional medicine, require detailed investigation with ethno pharmacological approach. The plant has been reported extensively as anticancerous, antimicrobial, antidiabetic, antibacterial, antifertility and antipsychotic agent. The recently developed isolation, characterization techniques and pharmacological testing have led to interest in plants as a source of new drugs. The pharmacological activity of *Alstonia scholaris*, which will substantiate the use of this plant over centuries for medicinal purposes.

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