



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Review Article

A Compressive Review on Enthanobotony and Enthanopharmacology of Alstonia Scholaris

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ARTICLE INFO

Published: 26 Jun. 2025

Keywords:

Alstoni Scholaris,
Pharmacological, Spectrum,
Drugs

DOI:

10.5281/zenodo.15747465

ABSTRACT

Crude drug obtained from different natural source are used in treatment of wide spectrum of disease. Most of the crude drug are obtained from plant and only a small number come from animal and minerals origin. Drug obtained from plant consists of entire plant or their parts. Alstonia Scholaris is native to South -East Asian Countries and the Indian Subcontinent. In India, the plant is found all over the sub - Himalayan region. especially east of the Yamuna river. The genus Alstonia comprises about 60 species throughout the world and about 6 species occur in India. Amongst them, Alstonia scholaris, Alstonia macrophylla and Alstonia venenata R. Br. have medicinal importance. It possesses wide range of phytochemicals showing various pharmacological activities such as astringent, antimicrobial, antimalarial, diarrhoea and dysentery, improve immune power, anticancer. Material and Methods:- Literature about Alstonia Scholaris was collected by using electronic and library search. Result:- In this article we discuss and summaries compressive data about uses, phytochemistry, and pharmacology.

INTRODUCTION

In nineteenth century the term Materia Medica was use of the subject now known as Pharmacognosy. While studying Sarsaparilla it was Seydler a German scientist who coined the term Pharmacognosy in 1815 in the title of his work Analecta Pharmacognostica. Pharmacognosy is derived from two Greek words viz. Pharmacon (a drug) and Gignosco (to acquire

the knowledge of). [1] Ayurveda (literal meaning - science of life) provides medicine to large section of our population. World Health Organisation is actively encouraging developing countries to use herbal medicines which they have been traditionally used for centuries. Herbal renaissance is happening all over the world. Herbal products are safe in contrast to allopathic synthetic drugs. It was believed that this system deals with body and

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



the spirit. Lord Brahma originated the concept of Ayurveda, who is known as the creator of the world. The wellknown treaties are Charak Samhita and Sushruta Samhita. Rigveda and Atharvaveda. These are the oldest written texts on Ayurveda. The Atharvaveda entitled 8 divisions of Ayurveda: Surgery, science of fertility, internal medicine, pediatrics, surgery for head and neck, psychiatry, ophthalmology and toxicology, whereas Sushruta Samhita explains the process of skilled surgery.[2] In traditional medicine, there are many natural crude drugs that have the potential to treat many disease and disorders. One of them is Alstonia Scholaris. Alstonia scholaris is known by various names, for example Devil's tree, White cheese wood, verbal, Milkwood pines, mill wood, kilky pine, black board tree and Dita bark (English). Initially it was called as Echites scholaris, Echites pala, Tabernaemontana alternifolia (Anonymous, 1985). Linnaeus named the plant Echites scholaris

in 1767 and in the year 1811 Robert Brown renamed it as Alstonia in the memory of Prof. Charles Alston. The name of species scholaris was derived from the use of its wood in making blackboards for schools in South East Asia (Arulmozhi et al., 2007c; Baliga, 2010, 2012). In India, it is locally recognized by its different vernacular names (Saptaparna in Sanskrit, Chatian in Hindi and Satvin in Marathi). Saptaparni is an evergreen tree with small greenish-white flowers and a distinctive strong smell that can be observed from December through March in the sub-Himalayan regions in India. The plant has a greyish bark with a whitish-yellow latex. This herb has been used in Ayurvedic, Siddha and Unani medicine for the treatment of various health conditions ranging from debility to open wounds, impotence and jaundice. Saptaparni bark is said to be effective as an alternative to the malaria drug quinine



Morphological characteristics of Saptaparni:

Botanical name: Alstonia Scholaris

Family: Apocynaceae

Other names: Devil's tree, Scholar tree, Dita bark, Blackboard tree

Sanskrit name: Saptaparna, Saptachada, Chatraparna

Parts used: Leaves, flowers, latex, stem bark

Geographical distribution: Saptaparni is native to South-East Asian countries and the Indian subcontinent. In India, the plant is found all over the sub-Himalayan region, especially east of the Yamuna river. Saptaparni is also found in southern China, tropical Africa and some parts of Australia. Interesting facts: Alstonia Scholaris is believed to be inauspicious and the devil's abode which is

believed to be due to the strong fragrance of its flowers that is apparent especially in the night.

Use:

Saptaparni (*Alstonia Scholaris*) health benefits

Saptaparni (*Alstonia Scholaris*) for healing wounds

Antimicrobial effects of Saptaparni (*Alstonia Scholaris*)

Antimalarial effects of Saptaparni (*Alstonia Scholaris*)

Saptaparni (*Alstonia Scholaris*) helps manage diarrhea

Saptaparni (*Alstonia Scholaris*) stimulates the immune system

Saptaparni (*Alstonia Scholaris*) effects on liver

Anticancer effects of Saptaparni (*Alstonia Scholaris*)

PHARMACOLOGICAL EFFECTS:-

Astringent Effect:

Alstonia is a bitter and astringent herb that is used for the treatment of skin conditions, diarrhoea and snake bites in Ayurvedic medicine, while *Alstonia* bark is used as an alternative to quinine for malaria treatment.

Treatment for wound :-

Alstonia plant is known to be highly effective in the treatment of wounds. A study done on animal models showed that methanol extracts of *Alstonia* leaf promote healing of open wounds. In another study done on animal models, treatment with *Alstonia* extracts was shown to improve skin healing and promote skin regeneration in wounds. However, since there is no clinical study to prove the wound-healing effects and safety of *Alstonia* on open wounds, it is best to consult an experienced healthcare practitioner before using *Alstonia* on any kind of wound.

Antimicrobial effects of Saptaparni (*Alstonia*)

Alstonia or Saptaparni is rich in biologically active compounds that impart it potent antimicrobial properties. Various parts of the Saptaparni plant have been shown to be beneficial against a wide range of bacteria—both gram-positive (those that stain blue with gram stain) and gram-negative (those that stain red with gram staining) bacteria. These include *E coli* (causes diarrhoea and dysentery), *Klebsiella pneumoniae* (causes pneumonia and wound infections), and Methicillin resistance *Staphylococcus aureus* (MRSA).

In a study done in India, natural dye obtained from *Alstonia scholaris* bark was found to be effective against a wide range of bacteria including *Psuedomonas aeruginosa* (causes infections of the skin, lungs and urinary tract) and *Bacillus cereus* (causes food poisoning). It was also found to be effective against the fungus *Aspergillus flavus* (causes skin and wound infections) and the common infectious yeast *Candida albicans*.

According to a study published in the International Journal of Current Pharmaceutical Research, root and bark extracts of *A. scholaris* are more effective antimicrobials than stem and bark extract, which is stronger than the fruit, flower and leaf extracts of this plant.

Antimalarial effects of Saptaparni (*Alstonia scholaris*)

The bark of *Alstonia* plant is said to be an effective substitute of the antimalarial drug quinine. Several studies indicate the antiplasmodial activity of *Alstonia* against the malarial parasite *Plasmodium*. A study done in Tamil Nadu, India, indicated that the leaf and bark extracts of *Alstonia* plant possess antiparasitic activity against *Plasmodium falciparum* (the deadliest malaria parasite to infect humans).

However, the antimalarial activity of *Alstonia* plant is a bit controversial. For example, a study done in Chandigarh, India, found no effect of *Alstonia* against *Plasmodium*.



Another study published in the Journal of Ethnopharmacology indicated that the active compounds present in *Alstonia* plant were found to be ineffective against *Plasmodium* spp.

Anti Diarrheal Effect

Alstonia is traditionally used for the treatment of diarrhoea and dysentery. A study done on animal models found that the methanolic extract of *Alstonia* plant not only helps to relieve diarrhoea but also it has antinociceptive (reduced awareness of pain) effects on the body. Ethanolic extract of *Alstonia* bark was found to be effective in reducing the defecation frequency in mice models with diarrhoea. Compounds like saponins, tannins and some alkaloids were said to be responsible for these effects.

Stimulates the immune system:-

Alstonia is known as a strong immunomodulatory herb. In a study done on mice, aqueous extracts of *Alstonia* plant were shown to improve immune function and reduce allergic reactions at various doses. In a study done in Madhya Pradesh, India, the stem bark of *Alstonia* plant was indicated to be effective in stimulating both the humoral and cell-mediated immune system. These are two arms of the acquired immune system, the immunity we develop slowly as we face new pathogens.

Effects on liver:-

Animal studies indicate that *Alstonia* has hepatoprotective properties. In one such study done in India, it was found that the ethanolic extract of *Alstonia* plant is effective in reducing liver damage and restoring liver architecture. Another study done in Taiwan indicated that the hepatoprotective effects of *Alstonia* are comparable to that of *Bupleurum chinense*, a herb well known for its beneficial effects on liver health.

Anticancer effects of *Saptaparni* (*Alstonia scholaris*)

Several studies indicate the anticancer effects of *Alstonia* extracts. A study done in Karnataka, India, suggested that *Alstonia* extracts, when given along with a drug called berberine hydrochloride, can suppress tumorigenesis (development of tumours) in early stages. However, it does not have a significant effect in the later stages of tumour development.

In another study done in India, the alkaloid fraction of *Alstonia* plant was indicated to have a stronger anticancer effect than the chemotherapy drug cyclophosphamide.

Both in vivo and in vitro studies indicate that *Alstonia* extracts reduce the number of mutations and hence prevent cancer development.

Anti tumor Effect:-

Methanol extracts of the leaves, stem bark and root bark of *Alstonia* plant are suggested to be effective in suppressing the growth of *Mycobacterium tuberculosis*, the bacteria that cause tuberculosis.

An in vitro study done in Korea showed that *Alstonia* bark extract is effective in increasing the antiageing effects of topical retinoids and reducing the skin irritation caused by them. Topical retinoids are medications that increase collagen production in skin and help in reducing fine lines and wrinkles. However, they sometimes cause side effects like inflammation, scaling, and erythema (redness of skin).

Anti -tussive Effect:-

Alstonia extracts have been shown to possess anti-tussive (relieving cough), expectorant (promotes sputum expulsion) and anti-asthmatic effects. In in vivo (animal) studies, an alkaloid called picrinine present in *Alstonia* plant was suggested to be responsible for its anti-asthmatic and anti-tussive effects.



Miscellaneous Effect:-

In animal studies, *Alstonia* is indicated to have both anti-inflammatory and analgesic (pain-relieving) properties.

A decoction made from *Alstonia* bark is suggested to help reduce hypertension. *Alstonia* is said to promote breast milk production and release in lactating women.

The milky sap of *Alstonia* plant is traditionally used to heal ulcers. An in vivo study found that the ethanolic extracts of *Alstonia scholaris* leaves is effective against stomach ulcers.

Alstonia is traditionally used to treat chronic diarrhoea, stomach pain, snake bites, tooth pain and dysentery.

Alstonia leaves are used to treat beriberi (caused by vitamin B1 deficiency).

PHYTOCHEMISTRY:-

Part of the plant	Phytoconstituents
Leaves	Picrinine, Echitamine, Losbanine, Lagunamine.
Steam Bark	Scholaricine, Echitamine, Echitaminic acid, Echitamidine N- oxide,
Root	Akuammicine
Flower	Terpinen -4-ol, alpha-Terpineol.

CONCLUSION:-

Recent pharmacological studies demonstrated various biological and pharmacological activities to *Alstonia scholaris*. The findings of antimicrobial activity studies of *Alstonia scholaris* validates its well-known traditional and ethnopharmacological uses in the treatment of infectious diseases. However, current studies are insufficient to establish *Alstonia scholaris* as an authentic antimicrobial agent. Hence, further in-

depth studies regarding possible synergy, antagonism and potential against multi drug-resistant human pathogen are essential. Leaves and stem bark of *Alstonia scholaris* have showed potent and wide range of biological and pharmacological activities. However, the available literature reports are insufficient to establish the exact medicinal value of parts, hence, further detail phytochemical and pharmacological studies are warranted.

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HOW TO CITE: Mangeshkumar Lilhare*, Priti Neware, Shubham Parihar, A Compressive Review on Enthanobotony and Enthanopharmacology of *Alstonia Scholaris*, *Int. J. of Pharm. Sci.*, 2025, Vol 3, Issue 6, 5031-5036. <https://doi.org/10.5281/zenodo.15747465>