



## *Alstonia Scholaris*: A Brief Review

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### ABSTRACT

Our nature is surrounded with wide variety of plants and many of them are having medicinal properties. These medicinal plants have been playing an essential role in the development of human being. They contain the substances that provide nourishment essential for maintains of life and for growth. The medicinal plants have achieved very important role in health care system all over the world. *Alstonia scholaris* is an evergreen tropical tree in the family of apocynaceae, commonly called as devils tree, dita bark and saptaparna. Different parts of it are used as traditional medicine as well as it is proven to have to treat malaria, rheumatism, fever, skin diseases, dysentery etc. They are the rich source of many kind of alkaloids, flavonoids and phenolic compounds.

**Keywords:** *Alstonia scholaris*, Saptaparna, Vishaltwak, Chatraparna, Shalmalipatrak.

### INTRODUCTION

Herbal medicine has now become an integral part of standard healthcare, as they are used both traditionally as well as in ongoing scientific research. Herbal medicines are rich in natural substances that can promote health and reduce illness. In ayurveda plenty of herbs are enlisted to cure different ailments. The plant *Alstonia scholaris* also known as Devils tree or Dita Bark tree belonging to Apocynaceae family, has been used in Ayurvedic, Unani and Sidhha/Tamil types of traditional medication for the treatment of diseases and ailments of human being. The plant is grown in the lowland and mountain rainforests of India, the Asia-Pacific, Southern China and Queensland.<sup>1</sup>

**Synonyms:** Vishaltwak, Chatraparna, Shalmalipatrak, Gucchapush-pak, Sharada, saptaparna, Saptacchada, Madaganda etc.<sup>2</sup>

### Propagation and Cultivation

It is easily raised through seeds and prefers fairly most conditions. The tree is sometimes planted in gardens for ornamental purpose (Fig 1). It grows in soil including alluvia, basaltic red earth, yellow earth with grey brown top soil, sandy grey earth. The necessary Altitude is 0-900 M. The required mean annual rainfall is 1200-1400 mm.<sup>3</sup>

### Taxonomical Position<sup>4</sup>

Kingdom	Plantae
Order	Gentianales
Family	Apocynaceae
Tribe	Plumeriae
Subtribe	Alstoniinae
Genus	Alstonia
Species	<i>Alstonia scholaris</i>

### Botanical Description<sup>5-7</sup>

*Alstonia scholaris* is a large, evergreen tree, approximately 6–10 m in height.



**Figure 1:** *Alstonia scholaris* tree

**Bark:** Its bark is rough, having grayish white to whitish color inside and exuding yellowish bitter latex when injures.

**Leaves:** The leaves are thick, dark green, arranged in whorls, obovate to oblanceolate, narrow at the base, entire, rounded or bluntly acuminate at apex, petioles 6–12 mm long (Fig 2).



**Figure 2:** *Alstonia scholaris* leaf

**Flowers:** Greenish white small flowers in umbellate branched manner. They are 7-10 mm long, the tube is hairy, lobes sparsely or densely pubescent; 1.5-4 mm long, the left margins overlapping, strongly perfumed. In India, the flowering period is during December to March (Fig 3).



**Figure 3:** *Alstonia scholaris* flower

**Fruit:** The fruits are a pair of follicles, linear, 20–50 cm long, glabrous, narrowly winged on one suture. In India, the fruiting period is during May to July (Fig 4).



**Figure 4:** *Alstonia scholaris* fruit

**Seeds:** Seeds are oblong, 6–8 mm long, flattened with a tuft of brownish hair at either end.

## Phytochemistry

Commonly *A. scholaris* plant contains alkaloids, coumarins, flavonoids, leucoanthocyanins, reducing sugars, simple phenolics, steroids, saponins and tannins. Leaf extract contain the eight elements such as Cu, Zn, Fe, Ca, Cr, Mn and Cd.<sup>8</sup> Ethanolic extract of leaves contain four picrin type monoterpenoids indole alkaloids, 5 $\beta$ -methoxyaspidophylline, picrinine, picralinal, 5-methoxystrictamine, methanolic extract of leaves contain the first seco-uleine alkaloids.<sup>9</sup> The hydro alcoholic extract of leaves contain 2, 3 secofernane triterpenoids, alstonic acids A and B, together with an indole alkaloid, N-methoxymethyl picrine.<sup>10</sup>

## Traditional and Local Uses

Different parts of *A. scholaris* have been used in medicine of ayurveda, Siddha, Unani in India for the treatment of jaundice, gastrointestinal disease, malaria, cancer etc. The bark of *A. scholaris* is used as laxative, antipyretic, astringent and cardiotoxic and also used to treat pruritis, leprosy, skin diseases, bronchitis, asthma and ulcer. Traditionally leaves are used for treatment of malaria, diarrhea and dysentery. Fruits are used as tonic and anthelmintic and also used to treat epilepsy.<sup>11</sup>

## PHARMACOLOGICAL ACTIVITIES

### Antibacterial activity

Methanolic extract of the *A. scholaris* bark was found to be active on Gram positive bacteria i.e. *Bacillus coagulans* and gram negative bacteria i.e. *Escherichia coli*.<sup>12</sup>

### Analgesic and anti-inflammatory activity

Leaf of *A. scholaris* contain alkaloids like picrinine, vallesamine and scholaricine are reported to show analgesic and anti-inflammatory activity based on several in vivo assays. The alkaloids inhibited COX-1, COX-2 and 5-LOX mediators of inflammation in invitro tests.<sup>13</sup>

### Antidiabetic and antihyperlipidemic activity

Ethanolic extract of *A. scholaris* and glibenclamide were found to significantly reduce the blood glucose level, glycosylated hemoglobin and lipid peroxidation, whereas they increased body weight, liver and muscle glycogen and antioxidant status, whereas histopathology of pancreas revealed that the pancreatic  $\beta$ -cell damage with streptozotocin did not reverse.<sup>14</sup>

### Anti-arthritis and antioxidant activity

*A. scholaris* ethanolic extract decreased the arthritis significantly which was apparently visible with arthritis index, body weight and leukocyte infiltration, as well as significant reduction in gastric lesion indices and gastric juice secretion. Significant increase was found in the antioxidant enzymes such as glutathione, glutathione peroxidase and superoxide dismutase, as well as significant reduction in the levels of lipid peroxidation and myeloperoxide in the articular tissue were evident.<sup>15</sup>

**Anticancer activity**

The bark extract of *A. scholaris* has been proven anticancer activity against radiation induced biochemical alteration in mice by ameliorating cholesterol and lipid peroxidation. Alcoholic extracts of *A. scholaris* reportedly reduced the total aberrant cells and it reduced total frequencies of aberration *in vivo*.<sup>16</sup>

**Antitubercular activity**

Methanolic extracts of leaf, stem bark and root bark of *A. scholaris* has been proven to have anti-tubercular activity. The anti-mycobacterial activity showed that *A. scholaris* extract has the potential to cure tuberculosis.<sup>17</sup>

**Antifertility activity**

Lupeol acetate isolated from benzene extract of *A. scholaris* has been reported to exhibit antifertility effect.<sup>18</sup>

**Hepatoprotective activity**

The methanolic stem bark extract of *A. scholaris* was effective in bringing the functional improvement of hepatocytes and proven to significantly decrease the biochemical parameters such as SGOT, SGPT, ALP, TP and TB.<sup>19</sup>

**Ameliorating effect**

Aqueous bark extract of *A. scholaris* has been reported to reduce injury in the liver and kidney sections histopathologically compared to viper venom which may be attributed to the complexation of polyphenols with venom enzymes.<sup>20</sup>

**CONCLUSION**

The plant *Alstonia scholaris* is an evergreen tree. Many parts of this plant has been used in traditional systems of medicines for treating various ailments such as antibacterial, antimicrobial, astringent, asthma etc. The plant contains various chemical constituents mostly alkaloids, coumarins, flavonoids, leucoanthocyanins, reducing sugars, simple phenolics, steroids, saponins and tannis. Apart from these many researches has been done on this plant and proven that the plant is having many pharmacological activities.

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