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A COMPHRESENSIVE REVIEW ON *ALSTONIA SCHOLARIS* R.BR WITH SPECIAL REFERENCE TO NIGHANTUS

Poonam Chhabra[1]*, Amitabha Daripa[2] and Ushasi Ghosh Chaudhury[3]

[1]Assistant Professor, Department of Dravaguna Vigyan, Belley Sankarpur Rajib Gandhi Memorial Ayurvedic College and Hospital, Kushdanga, West Bengal, India.

[2]Assistant Professor, Department of Dravyaguna Vigyaan, Raghunath Ayurveda Mahavidyalaya & Hospital, Contai, Purba Medinipur, West Bengal, India.

[3]MD Scholar, Institute of Post Graduate Ayurvedic Education and Research, Shyamadas Vaidya Shastra Peeth Hospital, Kolkata, West Bengal, India.

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***Corresponding Author**
Poonam Chhabra
Assistant Professor, Department of Dravaguna Vigyan, Belley Sankarpur Rajib Gandhi Memorial Ayurvedic College and Hospital, Kushdanga, West Bengal, India.

ABSTRACT

Our nature has gifted our planet with wide variety of flora and many of them have significant medicinal properties and humankinds are using them to cure various ailments and diseases since time immemorial. But unfortunately still many herbs lies unexplored and need extensive research. One such well known plant is *Alstonia scholaris* R.Br which is popularly known as the Saptaparna & Devil's tree. It is an evergreen tropical tree. Different parts of it are used as traditional medicine as well as it is proven to have Anti-diabetic, Antibacterial, Antidiarrheal, Immunomodulatory, Analgesic and anti-inflammatory activities etc. It is useful in treatment of malaria, diarrhoea, rheumatism, skin diseases, dysentery etc. It is reported to contain various alkaloids, flavonoids and phenolic acids which have bestowed this plant with ample amount of medicinal potential. Purans and various ancient Samhitas like Charaka Samhita, Sushurut Samhita, Nighantu Granthas viz. Dhanvantari Nighantu, Raj Nighantu, Madanpal Nighantu, Shaligram Nighantu, Kaiyadeva Nighantu, Bhavprakash Nighantu, had described *Alstonia scholaris* and its properties and therapeutic uses in detail. This review deals with compilation of the information regarding Saptaparna from ancient literature and recent discoveries.

KEYWORDS: Review, *Alstonia scholaris*, Saptaparna, Nighantu Pharmacological activities.

INTRODUCTION

Herbal medicine has now become an integral part of our Healthcare system, as they are used both traditionally as well as in on-going scientific research. Herbal medicines are rich in natural substances that can promote health and prevent us from getting ill. In Ayurveda quite ample 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 Ayurveda for the treatment of diseases and ailments of human being.[1]

Botanical name- *Alstonia scholaris* R.Br.

Family – Apocynaceae.

Classical names- Saptaparna, Vishalatwaka, Sharada, Vishamachchada, Brihatatwaka, Saptahva.

Vernacular name[2]

Eng- Ditabark, Devil tree

Hindi- Chattivan, Sativan, Sataunna

Beng.- Chatwan, Chhatim

Guj.- Saptaparna, Satvana

Kan.- Hale, Maddale

Mal.- Daivapal

Mar.-Satwin, Saptaparni

Punj.-Sathi, Satanna

Tam.- Ezhilaypatay, Achilampalai, Elilappalai, Palai

Tel.- Phalagaruda, Edakularaticettu, Edakulaphala

Assam- Satiana, Sattini

Oriya-Chhatiana, Kumbaro, Saptorposi

Namarupa Vijnana[3]

1. **सप्तपर्ण: (भा०)— एकस्मिन् वृन्ते सप्त पर्णाण्यस्य I**
2. **गुच्छपुष्पक: (अ०)—गुच्छे पुष्पान्यस्य I**
3. **ग्रहनाशन: (नि०) — ग्रहान्नाशयतीति I**
4. **छत्रपर्ण: (ध०)-- छत्रवत् प्रसृतानि पर्णान्यस्य I**

5. विशालत्वाक् :(भा०)— विशाला बृहत् त्वगास्य I

6. विशमच्छद: (भा०)— विषमा अयुग्माश्छदा: पर्णान्यस्यति च I

7. शारद: (भा०)— शरदिपुष्पविकसनशील I

8. शाल्मलिपत्रक: (ध०)-- शाल्मले: पत्राणिव पत्रान्यस्य I

9. शिरोरुक् ई(नि०)—शिरसि रुजा जायते पुष्प गन्धेनास्य I

10. शुक्तिपर्ण: (ध०)-- शुक्त्याकाराणि पर्णान्यस्य I

11. सप्ताहव्: (अ०)—सप्तनांमधेय: I

Saptaparna (*Alstonia scholaris* R.Br) is an ornamental tree generally with seven leaves (saptaparna, saptahva) together in a petiole like those of shalmali (shalmali-patraka) & shaped like oyster-shell (shuktiparna).They are found mostly in odd numbers (visamacchada) and it spread like umbrella (chatraparna). Bark of the plant is thick and large (vishalatvak). It blossom in autumn (sarada), flowers with intense odour (madagandha) which causes headache (shiroruk), flowers occur in clusture (gucchapuspaka). The plant provides a potent drug for malarial fever (visamcchada) and grahas (grahanashana).

Literature Review

1. Veda[4]

The Rigveda, the oldest extent source, deals with decent number of drugs which may be called as oldest drug stock of Ayurveda. The Vedas are considered to be the oldest scriptures, most important and highest written authority, but in Vedic literature there is no reference of the drug Saptaparna.

2. Purana[4]

Table No. 1: Showing references mentioned in Ramayana.

Ref. as 'Saptachada'	Ref. as 'Saptaparna'	
Kishkindha Kanda 30/30	Aranya Kanda 75/24	Uttara Kanda 22/57
Kishkindha Kanda 30/35	Kishkindha Kanda 30/62	Uttara Kanda 39/3
Kishkindha Kanda 32/13	Kishkindha Kanda 49/17	Uttara Kanda 42/24
Sundara Kanda 02/10	Sundara Kanda 14/36	Sundara Kanda 15/9

3. Sanskrit Literature[4]

Kalidasa a great poet of Sanskrit literature has written many works. One among them is Raghuwansha mahakavya, it contains a poetic description of Saptaparna with regards to the Mada gandha of its Pushpa and Ksheera.

A) Samhita Kala

Maximum number of references is quoted in Asthanga Samgraha (37) followed by Charaka Samhita (31).Asthanga Hridaya has listed least number of references of Saptaparna in comparison to other samhitas.

In **Charaka Samhita** totally 31 references were found in 16 different Adhyayas of 4 different Sthanas. In Sutra Sthana 5, Vimana Sthana 4, Chikitsa Sthana 19 and in Siddhi Sthana 3 references were mentioned. Out of 19 references in Chikitsa Sthana maximum 8 times it is used in Kushtha Chikitsa. Chakrapani in his Charakatatparya tika has quoted that "Patha" and "Saptaparna" as the drugs having Rasayana property in Swastha and Rogahara property in Arta (Patient). Hence they have a potential of performing "Ubhaya-arthakrita karma". (Ch. Ck. Chi. 1/1/5).

In **Sushruta Samhita** total 28 references are scattered in 17 Adhyayas of 4 Sthanas. In Sutra Sthana 6, Chikitsa Sthana 16, Kalpa Sthana 2, Uttaratantra 4 references are quoted. In Kushtha Chikitsa maximum 8 references were found. Dalhana in his Nibhanda Samgraha Tika has described botanical description of Saptaparna in detail.

In **Asthanga Samgraha** total 37 references are mentioned In Asthanga Samgraha total 37 references are mentioned in 21 different Adhyayas of 4 Sthanas. Out of which in Sutra Sthana 11, Chikitsa Sthana 16, Kalpa Sthana 1 and 9 in Uttaratantra are quoted. Vriddha Vagbhata has used Saptaparna abundantly in Kushtha Chikitsa 10 times.

In **Asthanga Hridaya** total 20 numbers of references are divided into 13 different Adhyayas of 4 different Sthanas. Maximum 13 references are found in Chikitsasthana followed by Uttaratantra 4 and Sutrasthana 2. Kalpasthana states only 1 reference regarding a content of Panchatikta Panchaprasutik Basti.

The Classical categorization of Saptaparna according to various Classical texts[5]

In **Charak Samhita**, it is mentioned under Tikta Skandha, Kashaya skandha, Kusthagna Mahakasaya, Udardaprasamana Mahakasaya

In **Susruta Samhita**, it is cited under Aragvadadi Gana, Laksadi Gana

In **Astanga Hridaya**, it is mentioned under Aragvadadi Gana

Table No.2. Showing the indication of Saptaparna according to various Ayurvedic texts.

Classical Text	Indication	References
Charak Samhita	Stanya roga, Kustha,	Ch. Chi-7/14 Ch .chi- 7/126 Ch . chi 30/ 247
Susruta Samhita	Kasa, Shwasa, Sandra meha	Su. Chi- 11 Su. U-51
Astanga Hridaya	Shwas, Hikka	A.H.U-39

Charaka quoted its flowers under Shirovirechana dravyas, whereas Susruta mentioned it under Adhobhagahara dravyas.

B) NIGHANTU KAL

Table No. 3: Showing the Classical categorization of Saptaparna according to various Nighantus.

Drug	D.N[6] 10-13thAD	K.N[7] 15th AD	M.P.N[8] 14th AD	R.N.[9] 15thAD	S.N.[10] 19th AD	B.P.N[11] 16th AD
Saptaparna	Chandanadi Varga	Oushadi Varga	Vatai Varga	Pippaladi Varga	Vatadi Varga	Vatadi varga

(D.N- Dhanvantari Nighantu, K.N- Kaiyadeva Nighantu, R.N- Raj Nighantu, M.N- Madanpal Nighantu, S.N- Shaligram Nighantu, B.P. N. – Bhavaprakasha)

Table No. 4. Showing synonyms of Saptaparna according to various Nighantus.

Synonyms	D.N[6]	K.N[7]	M.N[8]	R.N[9]	S.N[10]	B.P.N[11]
Saptaparna	+	-		+	+	
Suktiparna	+	+	-	+	-	-
Chatraparna	+	-	-	-	-	-
Saptacchada	+	-	-	+	-	-
Gudapuspa	+	-	-	+	-	-
Salmalipatraka	+	+	+	+	-	-
Triparna	-	+	-	-	-	-
Guchhapuspak	-	+	+	-	-	-
Bahuchheda	-	+	-	-	-	-
Chatri	-	+	+	-	-	-
Sharad	-	+	-	-	+	+
Visaltwak	-	-	-	-	+	+
Vishalcchada	-	-	-	-	-	-
Suparnaka	+	-	-	+	-	-
Vismacchada	-	-	-	-	+	+
Patraparna	-	-	-	+	-	-
Gandhiparna	-	-	-	+	-	-
Bahuparna	-	-	-	+	-	-

"+ '' denotes same name was mentioned in various Nighantu. " -" denotes this name was not mentioned**.**

The synonyms Shalmalipatrak is most common used synonym whereas Patraparna, Gandhiparna, Bahuparna are used only in Rajnighantu.

Table No. 5. Showing Rasapanchak, Main Action and Uses of Saptaparna according to various Nighantus.

Nighantus	**D.N**[6]	**K.N**[7]	**M.P.N**[8]	**R.N**[9]	**S.N.**[10]	**B.P.N**[11]
Rasa	-	Kashaya	-	Tikta	-	Kashaya
Guna	Sara	Susnigdha Sara	Sara	-	-	Snigdha Sara
Virya	-	Usma	-	Usma	-	Usma
Vipak	-		-		-	-
Effect on Tridosa	Tridosha shamana	Dosajita	Slesma - Vata hara	Tridoshagna	-	Kapha Vata nasak
Action and Uses	Hridya Sugandhita Shula Gulma Krimi Kustha	Deepan Hridya Krimi Kustha Gulma Vrana Asrajita	Vrana Kustha	Deepana Madagandha Vrana Rakta-amaya Krimi	-	Agnideepak Vrana Kustha Raktavikar Jantunasak Shvasa Gulma

C) Adhunika Kala

Nighantu Adarsh: (1928 A.D.)[12]

This book is written by Bapalal Vaidhya. He has given compilatory description with scientific approach regarding the drug Saptaparna. He had given Nirukti of some important synonyms.

Dravya guna Vignan[13]

Two writers (1) P.V Sharma (2) Y. T. Acharya have written the book namely Dravya Guna Vijnana. They have described the drug in detail with Synonyms, Vernacular names, Classification, Rasa Panchaka and Utility of the drug. But P.V. Sharma has given detailed action of drug on our different systems of the body.

Botanical description[2, 5]

It is a large, buttressed evergreen tree, 12-18 m high with whorled branches and bitter milky juice.

Leaves are 4-7 in a whorl, oblong-lanceolate or obovate, tapering at the base into a short petiole.

Flowers are greenish white or greenish yellow, in compact, umbellate cymes, fragrant.

Fruits are slender follicle, 30-60 cm long, in clusters, cylindric.

Seeds 8mm long, flattened with long tuft of brown hairs at each end.

Flowering from December- March and fruiting from May- July.

Fig.1. Showing trunk

Fig. 2. Showing leaves and flowers

Fig.3. Showing fruits

Fig.1. https://images.app.goo.gl/WHMNHpCCY3fPuk4x9

Fig. 2. https://images.app.goo.gl/BEAreKGjuPH2g88J9

Fig .3. https://images.app.goo.gl/BEAreKGjuPH2g88J9

Distribution[2]

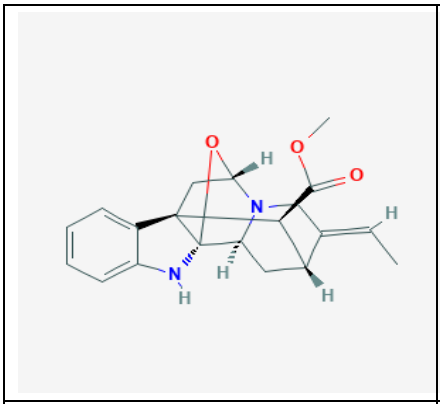
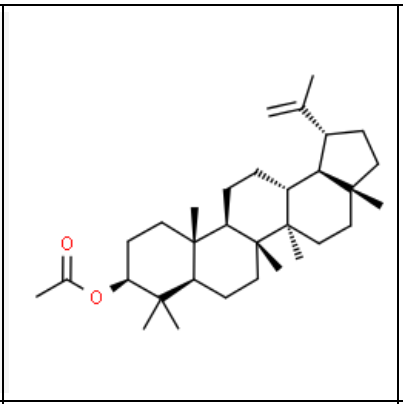
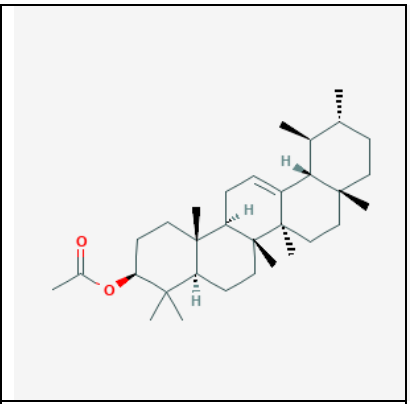
Throughout India, up to an altitude of 600 m in deciduous and evergreen forests and also in plains.

Part used[5]

Bark, leaf, latex.

Chemical constituents[2]

Picralinol, an indole alkaloid – picrinine, pseudoakuammigine, ursolic acid, betulin, β-sitosterol and a new alkaloid **(-)** scholarin obtained from leaves; echitamine, new glucoside-venterpine**,** glucosid**e** triterpenes, α-amyrin acetate, lupeol acetate obtained from stem bark, akuammigine, tubotaiwine akuammicine, hydroxyl-19,20- didydroakuammicine found in roots and alkaloids picrinine, strictamine from flowers are the chemical constituents reported from this plant.

		
Picrinine	**Lupeol acetate**	**α-amyrin acetate**

Action and uses[2]

The stem bark is bitter, astringent, acrid, thermogenic, laxative, digestive, anthelmintic, febrifuge, antipyretic, galactogogue, stomachic, cardiotonic and tonic. It is used in malarial fevers, abdominal disorders, diarrhoea, dysentery, dyspepsia, leprosy, skin diseases, pruritus, tumours, chronic and foul ulcers, asthma, bronchitis, cardiopathy, helminthiasis, agalactia and debility. The tender leaves of this plant in the form of poultice are good for ulcers with foul discharges. The decoction of leaves is reported to be given in beri beri and used against liver congestion. The latex is applied to ulcers, sores, rheumatic pain, tumours, in itches and earache.

Ayurvedic properties[5, 13]

Rasa- Tikta Kashaya

Guna- Laghu, Snigdh

Veerya- Ushna

Vipaka- Katu

Doshaghnata- Kaphapittashamaka

Rogaghnata- Agnimandya, Krimi, Gulma, Pravahika, Kustha, Udarda, Jwara, particularly Vishamjwara, Jwarajanyadaurbalya, Kasa, Shwasa, Hridaroga, Raktavikara, Jeernavrana, Yakriddaurbalya.

Karma- Kusthaghna, Vranashodhna-Ropana, Deepana, Anulomana, Yakridbalya, Krimighna, Raktashodhaka, Hridya, Stanyajanana, Vishamajwaraghna.

Doses- Bark powder- 4-8gm, Decoction- 20 to 30 gm drug.

Pharmacological activities[2]

Hypotensive, anticancer, antimicrobial, antimalarial, CNS depressant (picrinine); strictamine showed monoamine oxidase, inhibitory as well as anti-depressant activity.

Formulations and Preparations[2,5]

Saptachchhadadi kwath, Saptaparnaghna vati, Saptachchhadadi taila, Amritarishta, Saptaparnasata vati, Mahatikta ghrita, Mahakhadirakam ghrita, Triphala ghrita, Kandarpsara taila, Mahasugandhita taila, Aragvadhadi kwath, Vajraka taila, Marichyadi taila.

PHARMACOLOGICAL ACTIVITIES

1. Anti-diabetic activity

Potenta-glucosidase inhibitory activity was found in aqueous methanol extract of dried leaves of Devil tree (*Alstonia scholaris*). Active principles against a-glucosidase, prepared from rat small intestine acetone powder, were isolated and identified. The structures of these isolated compounds were found to be quercetin 3-O-b-D-xylopyranosyl (1000/200)-b-D-galactopyranoside and (_) -lyoniresinol 3- O-b-D-glucopyranoside on the basis of chemical and spectral evidence. The latter exhibited an inhibitory activity against both maltase and sucrase with IC50 values of 1.95 and 1.43 mM, respectively, whereas the former inhibited only maltase with IC50 values of 1.96 mM. This preliminary observation will provide the basis for further examination of the suitability of *Alstonia scholaris* as a medicinal supplement that contributes toward the treatment and prevention of diabetes.[14]

It is reported that EEAS and glibenclamide significantly ($p<0.001$) reduce the blood glucose level, glycosylated hemoglobin and lipid peroxidation, whereas they increased body weight, antioxidant status and liver and muscle glycogen. The antidiabetic effect was sustained from 1 week onwards till the end of the study. The histopathology of pancreas revealed that the pancreatic β-cell damage with streptozotocin did not reverse in any of the treatment groups.[15]

2. Antibacterial activity

Methanolic extract of the bark of A. scholaris bark was found to be active both on Gram positive bacteria i.e. Bacillus coagulans and gram negative bacteria i.e. Escherichia coli.[16]

3. Antidiarrhoeal activity

Patil etal reported antidiarrhoeal effects of the aqueous and the alcoholic bark extracts of A. scholaris in mice.[17]

4. Analgesic and anti-inflammatory activity

The leaf of *Alstonia scholaris* was extracted with ethanol and then separated into different fractions. The alkaloids fraction mainly, picrinine, scholaricine and vallesamine, may produce the anti-inflammatory and analgesic effect peripherally based on several in vivo assays. In in vitro tests, alkaloids exhibited inhibition of inflammatory mediators (COX-1, COX-2 and 5-LOX), which is accordant with results on animal models.[18]

5. Immunomodulatory activity

The immunostimulating effect of *Alstonia scholaris* bark extracts was studied in BALB/c mouse by Iwo et al .The aqueous extract at 100 mg/kg b.w. increased lytic activity of peritoneal exudate cells against Escherichia coli. At the both doses of 50 and 100 mg/kg b.w., the aqueous extract had no effect on primary antibody level. The aqueous extract at 50 mg/kg b.w. induced the cellular immune response while at 100 mg/kg b.w. it inhibited the delayed type of hypersensitivity reaction.[19]

CONCLUSION

Alstonia scholaris is an evergreen tropical tree. It is a state tree of West Bengal, India. The review on Saptaparna traces out from the puran to modern literature text, though its reference is not present in the Vedas. It has many medicinal properties, which can be used to cure many disorders like Agnimandya, Krimi, Gulma, Pravahika, Kustha, Udarda, Jwara, particularly Vishamjwara, Kasa, Shwasa, etc. It is katu, kshaya in rasa, Laghu, snigdha in guna, ushna in virya and katu in vipaka. The plant has long being researched for its phytochemicals and its pharmacological activities. The plant contains various chemical constituents mostly alkaloids, coumarins, flavonoids, glucoside, Scholarin, leucoanthocyanins, reducing sugars, simple phenolics, steroids, saponins and tannin etc. Many parts of this plant has been used in traditional systems of medicines for treating various ailments due to its Anti-diabetic, Antibacterial, Antidiarrheal, Immunomodulatory ,Analgesic and anti-inflammatory activities etc. However, many of the diseases treated indigenously using the plant have not been yet. sientifically validated. The pharmacological properties of constituents of *Alstonia scholaris* require detailed investigation which will authenticate the use of this plant over centuries for medicinal purposes.

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