

A promising ethnomedicinal plant *Atalantia monophylla* DC.: A review

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Abstract

Aim: *Atalantia monophylla* DC., Family-Rutaceae, is one among the traditionally used medicinal plant being used by the local healers for its multiple therapeutic indications. Present review aims to collect all available ethnomedicinal information and research updates on *A. monophylla*.

Material and Methods: Ethnomedicinal uses of *A. monophylla* were searched from available books related to medicinal plants and published research articles. Name of reporting tribe using the plant and their place of reporting, vernacular names, parts used along with the therapeutic uses with specific methods of administration were noted, along with various researches.

Results: *A. monophylla* has been reported for its traditional therapeutic uses in 3 countries across the globe and in 8 states of India. Various parts of the plants like leaf, root, root bark, stem, stem bark, fruit, berry and seed alone or along with other drugs are used in the management of 55 diseases conditions either through external applications or internal administration. Among these, maximum is indicated in the treatment of rheumatism, paralysis, cough, arthritis etc. Its leaf has maximum application in 33 disease conditions, followed by fruit in 29, root in 16, berry in 13, seed in 10, stem bark in 9, root bark in 3 and stem in 2 diseases condition. Its leaves are also used as pickle, engraving and cabinet-work. Pharmacological studies report its anti-inflammatory, immuno-modulatory, antioxidant activities, etc.

Conclusion: *A. monophylla* is a promising drug having multifaceted ethnomedicinal uses. Its use in rheumatism, paralysis, cough, arthritis etc. should be scientifically evaluated through pharmacological and clinical studies to establish the ethnic claims.

Keywords: ethnomedicine, folklore, rutaceae, *atavijambira*, *limonia monophylla*

Introduction

The health-related practice learned informally by word of mouth, through observation and demonstration is known as ethnomedicine. Many people in the world are still depend on herbal medicines and considerable amount of information on plants is still available with the tribes. The popularity of ethnomedicinal plants all over the world in recent years is a significant contribution of ethno medicine^[1].

The World Health Organization (WHO), has estimated that 80% of the global populations rely chiefly on traditional medicine^[2]. In India, 70% of the population relies on ethnomedicine which is the major source of their primary health care needs.

India has more than 550 tribal communities which have acquired considerable knowledge on uses of plants for their livelihood, healthcare and other purposes through their long association with the forest, inheritance, practices and experiences. Many of these experiences have proven to be

evidence-based medicine like andrographolide (*Andrographis paniculata*), morphine (*Papaver somniferum*), picroside (*Picrorrhiza kurroa*), artemisinin (*Artemisia alba*)^[3], etc. It is necessary to collect all information from the tribe for the use of human kind^[1].

Atavijambira (*Atalantia monophylla* DC.), syn. *Limonia monophylla* Linn.of Rutaceae family is a traditional and folklore medicinal plant with promising ethnomedicinal claims. Information about the ethnomedicinal uses of the *A. monophylla* is scattered over the multiple years, different platforms (i.e. journals, reports, book and web-based sources) and in different presentation formats (i.e. surveys, glossaries, reviews and notes amongst other). This makes the exploitation of this species for pharmaceuticals leads near impossible. Hence, in the present article, an attempt has been made to congregate the currently available data in one treatise.



Fig 1: General plant morphology of *A. monophylla* DC.

Materials and Methods

Data collection

Available literature pertaining the plant *A. monophylla* were compiled from 17 different floras and 2 floras in printed format (Flora of Davanagere District and Flora of Orissa) and 10 floras in e version, 73 books on ethnobotany and ethno medicinal research articles from library source as well as from Google scholar, Shodhganga and Researchgate web-based search engines, journals and presented in systematic manner, during March 2019 to September 2020.

Study selection

Inclusion criteria

Publication that described the use of *A. monophylla* (alone or with any combination of other herbs) to treat any diseases condition either human or animal or used as food i.e. having any economic value were included in the review. This includes both external and internal application with no language restriction and date limitation.

Exclusion criteria

Other species of *Atalantia* were excluded from the present review. The obtained data are arranged in a tabular form, with regard to various local names, as known by different tribes across India, name of the tribe and their area of presence, part used, therapeutic indication, external (E) and internal (I) usage of the drug are also noted in a separate column with individual references.

Result and Discussion

Literature acquired

In the present study, a total of 73, i.e. 21 from ethnomedicinal books and 52 abstracts was identified from electronic search. The search identified 52 articles, 44 from Google scholar, 5 from Shodhganga and 3 from Researchgate. After the removal of repetition, as well as screening from relevant titles and abstracts, a total of 50 articles underwent a full text review (Fig.2).

Availability

It is found common in dry deciduous forests and thorny scrub jungles of Peninsular India. Especially it is found in Odisha,

Assam, East Bengal of eastern India. Meghalaya, Khasi hills, N. Circars of north-eastern India. S. Mahrata country, W. coast, W. Ghats of western India. Southern peninsula from Konkan and Coromondal southwards, Konkan, N. Kanara, Madras state, Deccan, Andaman of Southern India [4, 5, 6, 7, 8]. It is also available in Bangladesh (Sylhet), Burma, Java [9], Sri Lanka to Indo-china, Malaya, north to N. Vietnam [10] (Fig.3).

Plant description

Atalantia monophylla DC. is a large shrub or small tree with spines; bark smooth; trunk often with branched spines; branchlets pubescent. Petiole 5-7 mm, pubescent. Leaflet ovate-elliptic or lanceolate, 2.5-7.5 x 1.2-3.5 cm, entire, obtuse, emarginate, glabrous, finely nerved with 1-8 secondary nerves, base rounded. Flower white, short axillary or subterminal, subsessile, pubescent corymbs; Pedicle 7-12 mm. Calyx subequally or irregularly shallowly 3-5 lobed. Petals 6 mm, adnate at base to the staminal tube. Ovary usually 4-celled, narrowly ovoid. Berry subglobose, 1.2-2 cm diam., 1-4-seeded. Flowering: February to March. Fruiting: May to June [10].

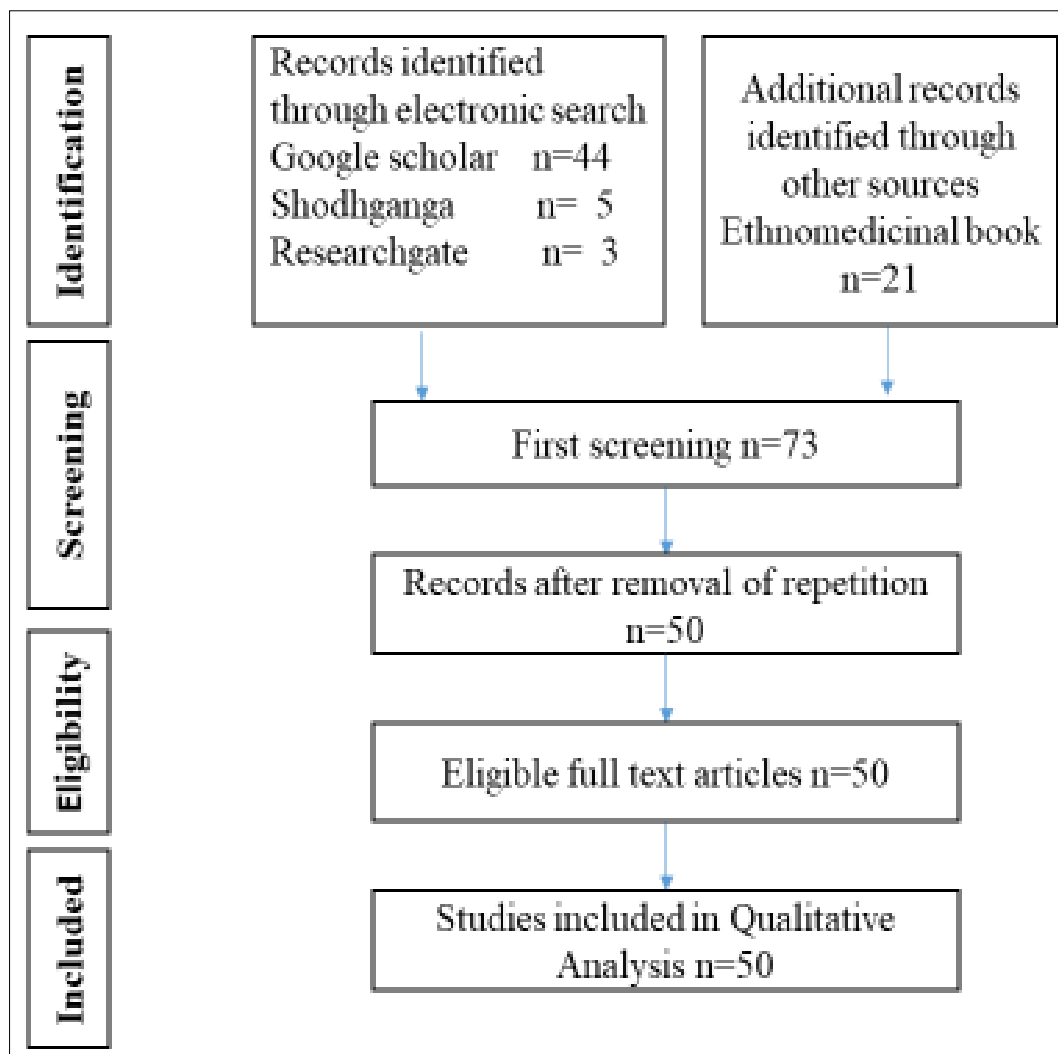


Fig 2: Graphical presentation collecting Ethnomedicinal Data

Used by tribes

A. monophylla is used in 8 states of India and 3 countries across the globe by 60 different tribes/communities to combat various diseases conditions or disorders (Table 2-10 & Fig.3).

Local name

A. monophylla is known by 19 names in 8 language. In eastern part of India, it is known as Saora: Karunimma, Motameri. Odia: Narguni, Katanarunga, Katonorangi.

Manipur: Ching-kamla. Lushai (Mizoram): Ramser. Hindi: Jungli nimbu. Kondh. Nargibarso. Western part in Gujarati: Dodi-nimbu. Deccan: Jhambir patri, Janglinimbu. Marathi: Makadlimbu, Makurlimbu, Ranlimbu. Southern part in Andamans: Tawthabya-twee. Kannada: Kadu nimbu, Kaadu nimbe. Konkan: Chor-nimbu, Ida-nimbu. Canarese: Adavinimbe, Dodlihuli, Kadunimbe. South Konkan: Matangnar. Malayalam: Kattukurunta, Kuttunarakam, Kolanna, Malanarakam. Tamil: Kattanaragam, Kattelumicchai, Kattuelemitchi, Kattukkichili,

Kattukkurundu, Kattupulasai, Kurundai, Kurunthai, Kurundu, Perungurundu. Tulu (Udupi): Kaiperipuli. Telugu: Gaja nimma, Adavimunugudu, Adavinimma, Ettamunukudu, Konda nimma, Koarulimma, Kaarulimma, Munkudu, Karunnimma, Yerramonukudu. Other countries in English: Wild lime. Duk. (Thailand): Malang-nar. Ceylon (Srilanka): Apassu, Dodampana, Perunkuruntu. Malay: Akarmerlimau, Empenai. Tagalog (Philippines): Dayapnamonti. Visayan (Cebuano): Magcabugao [5, 6, 9, 10, 11, 12] (Table 2-10).

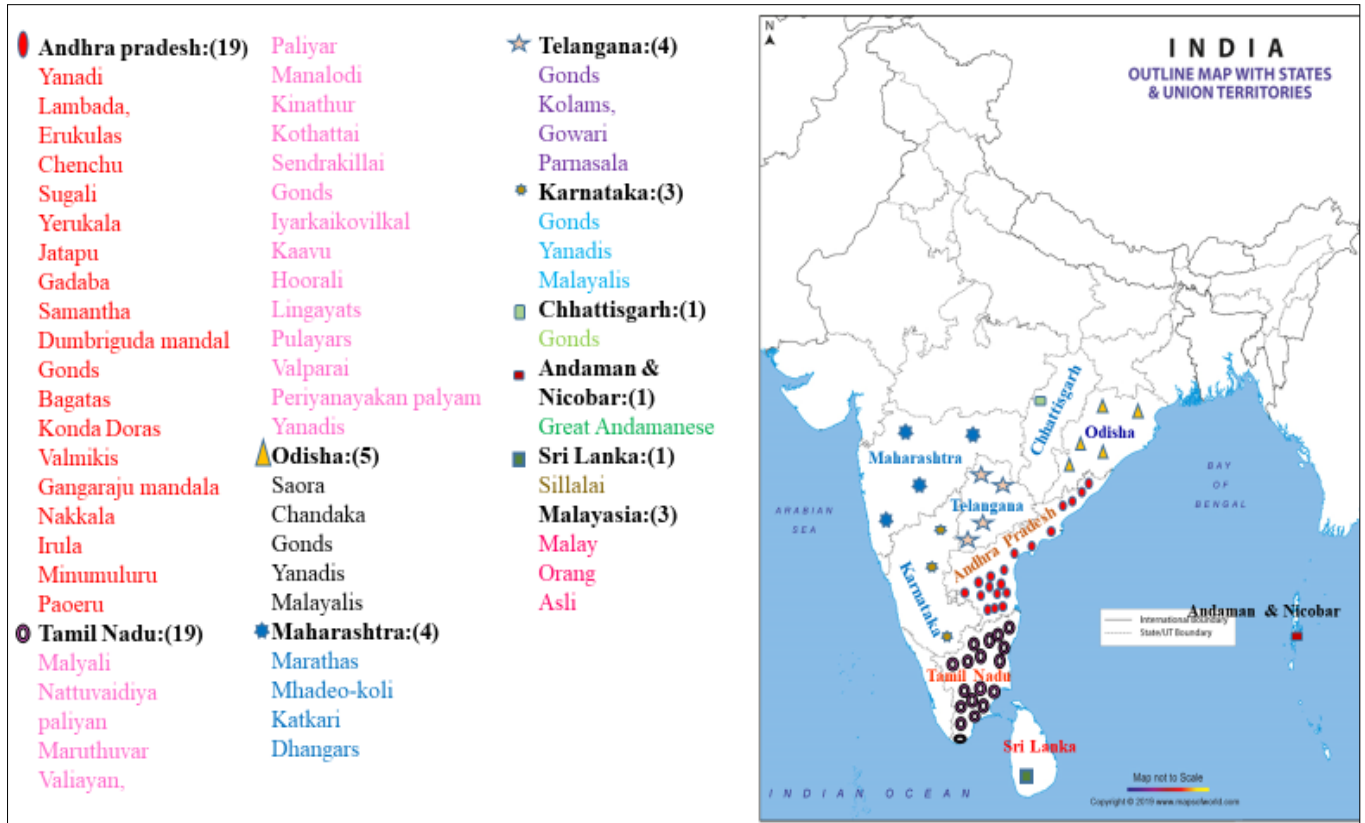


Fig 3: Use of *A. monophylla* by different tribes in various Indian states & other countries

Area of reporting

A. monophylla is available in 7 countries of the world, but being used as medicine in 3 countries i.e. India, Sri-Lanka and Malaysia. It is observed that *A. monophylla* is being used as medicine in 8 states of India, namely Odisha, Chhattisgarh, Tamil Nadu, Andhra Pradesh, Telangana, Karnataka,

Maharashtra and Andaman & Nicobar (Table 2-10).

Therapeutic uses

Various parts such as leaf, root, root bark, stem, stem bark, fruit, berry, seed and unspecified plant part are observed to be used in 55 different disease condition (Table 1).

Table 1: Reported uses of *A. monophylla* in various disease conditions

Sr. No.	No. of claims	Diseases condition	Area of reporting (part used)
1	19	Rheumatism	Tamil Nadu (R, L, B, F, Sb); Odisha (R, St., Sb, L, F); Andhra pradesh (R, L, B, F, S, Sb); Karnataka (R, L, F, Sb); Telangana (S); Andaman & Nicobar (-)
2	11	Cough	Tamil Nadu (R, Sb, F, S); Andhra pradesh (R, Sb, F); Odisha (R, Sb, F); Karnataka (R, Sb, F)
3	9	Paralysis	Tamil Nadu (F, (-)); Andhra pradesh (B, S); Telangana (S)
4	8	Fever	Karnataka (R, L, F); Tamil Nadu (L, F, S); Andhra pradesh ((-))
		Stimulant	Karnataka (R, L, F)
5	7	Antispasmodic	Tamil Nadu (R)
		Antiseptic	Karnataka (R, L, F); Andhra Pradesh ((-))
6	6	Phlegm	Tamil Nadu (R, Sb, L, F), Andhra Pradesh (R, Sb, L, F), Karnataka (R, Sb, L, F), Odisha (R, Sb, L, F),
		Post-natal complaint	Tamil Nadu (R), Odisha (R), Andhra Pradesh (R), Karnataka (R)
		Itch	Tamil Nadu (L)
7	5	Snake-bite	Karnataka (R, L, F); Ceylon (L)
		Skin diseases	Odisha (R, Sb, L, F), Andhra Pradesh (R, Sb, L, F), Tamil Nadu (R, Sb, L, F), Karnataka (R, Sb, L, F)

8	4	Arthritis	Odisha (St); Andhra Pradesh (-); Tamil Nadu (-); Chhattisgarh (-); Karnataka (-)
		Joint pain	Tamil Nadu (R, F); Andhra Pradesh (S); Sri Lanka (F)
		Rheumatoid pain	Tamil Nadu (L, F); Sri Lanka (L)
		Allergies	Odisha (R, F, L, Sb); Andhra Pradesh (R, F, L, Sb); Tamil Nadu (R, F, L, Sb); Karnataka (R, F, L, Sb)
		Anti-pyretic	-
9	3	Indigestion	Tamil Nadu (L, F, S)
		Abdominal pain	Tamil Nadu (L, F, S)
		Rheumatoid arthritis	Andhra Pradesh (Rb, Sb); Andhra Pradesh (F)
		Headache	Tamil Nadu (L); Andhra Pradesh (F)
		Cutaneous complaint	Tamil Nadu (L)
		Pain	Tamil Nadu (L, F, S)
10	2	Chronic rheumatism	Tamil Nadu (F)
		Glandular swelling	Tamil Nadu (L); Sri Lanka (L)
		Heart disease	Andhra Pradesh (Rb, Sb); Odisha ((-)); Chhattisgarh ((-)); Tamil Nadu ((-)); Karnataka ((-))
		Anti-rheumatic	Telangana (B); Odisha ((-)); Chhattisgarh ((-)); Tamil Nadu ((-)); Karnataka ((-))
		Anti-fungal	-
		Anti-bacterial	-
		Respiratory complaint	Malaysia (L); Andaman & Nicobar ((-))
		Swelling	Tamil Nadu (R)
		Body pain	Tamil Nadu (L); Odisha ((-)); Chhattisgarh ((-)); Tamil Nadu ((-)); Karnataka ((-))
11	1	Antidote to snake bite	Tamil Nadu (L)
		Eczema	Andhra Pradesh (Rb)
		Fungal infection	Tamil Nadu (F)
		Diseases of vata	Tamil Nadu (L, F, S)
		Ear trouble	Odisha (L)
		Dysentery	Andhra Pradesh (L)
		Hemiplegia	-
		Anti-dysenteric	-
		Scorpion bite	Andhra Pradesh (L)
		Insect-bite	Andhra Pradesh (L)
		Ringworm	Tamil Nadu (L)
		Anthelmintic	Maharashtra (F)
		Parasitic skininfection	Tamil Nadu (L)
		Resolvent	-
		Loss of taste	-
		Appetite	-
		Scabies	-
		Gastritis	Tamil Nadu (F)
		Strengthen of body	Tamil Nadu (F)
		Fissuring	-
Fits	Odisha ((-)); Chhattisgarh ((-)); Tamil Nadu ((-)); Karnataka ((-))		
Vomiting	Tamil Nadu (L, F, S)		
Stomach-ache	Malaysia (L)		

Not reported “-”; Root (R); Stem (St); Leaf (L); Seed (S); Fruit (F); Berry (B); Stem bark (Sb); Root bark (Rb) (-)-Unspecified plant part

Parts used

It was observed that various parts of the plant are claimed for ethnomedicinal uses. Among them the highest claim was reported for leaf followed by fruit, root, berry, stem bark, seed, root bark, stem of *A. monophylla*, alone or along with other drugs in the management of 55 diseases conditions either through external applications or internal administration. About 34 external applications and 16 internal administrations are reported, among them the highest in claims are for leaf (33) (internal 4, external 11) (Table 2, Fig. 4); fruit (29) (internal 4, external 10) (Table 3, Fig. 5); root (16) (internal 3) (Table 4, Fig. 6); berry (13) (internal 1, external 6) (Table 5, Fig. 7); seed (10) (external 3) (Table 6, Fig. 9); stem bark (9) (internal 3) (Table 7, Fig. 8); root bark (3) (internal 1, external 1) (Table 8, Fig.10); stem (2)

(external 2) (Table 9) diseases condition, but for various plant parts, it was reported that the application or administration method external or internal are not reported. In some study plant parts are not specifically noted. Hence those claims are noted separately of unspecified plant part (10) (external 1) (Table 10, Fig. 11).

Variation observed in the external application and internal administration and part used, as in some claims the mode of administration and part used was not vividly explained (Table 2-10)

Dosage form

Root, stem, leaf, berry, Fruit and seed of *A. monophylla* are used 5 dosage form i.e. oil (21), decoction (10), paste (10), juice (8) and liniment (1) (Table 2-10).

Table 2: Ethno-medicinal claims of *Atalantia monophylla* leaf

Sr. No.	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Narguni	Saora, Chandaka, Odisha	Juice of fresh leaves 2 gm. wrap in a banana leaf are heated on fire for 5 min. & is instilled in ear(E)	Ear troubles ^[13]
2	Yerra-munukudu	Chenchu, Yanadi, Erukala, Sugali, A. P.	Juice(I)	Dysentery ^[14]
3	-	-	Juice Liniment(E)	Hemiplegia ^[15]
4	Kurunthai	Nattu Vaidiya, Sthalavrikshas, T. N.	-	Itching ^[16]
5	Kattupulasai	Paliyan, Sirumalai hills Southern India, T. N.	Decoction	Rheumatic pain ^[17]
6	-	-	Decoction(I)	Itch & Cutaneous complaint ^[15]
7	Kattu elumichai	Malayali, Jawadhu hills Eastern Ghats, T. N.	Decoction(I)	Itch & Cutaneous complaint ^[18]
8	-	-	-	Anti-dysenteric, Anti-pyretic, Antidote to snake bite ^[19]
9	Kattu elumitchi	Perumal kovil hills, Iddappadi, Salem, T. N.	-	Antidote to snake bite ^[20]
10	Apassu, Dodampana	Sillalai, Jaffna, Sri Lanka	Decoction - The leaves are boiled with water(E)	Rheumatoid pain & Glandular swelling ^[21]
11	Kattu elemitchi	Maruthuvar, Villupuram district, T. N.	Decoction - The leaves are boiled with water(E)	Rheumatoid pain & Glandular swelling ^[22]
12	Kattu elumichai	Valiayan, Nagamalai hills, Madurai, T. N.	Paste(E)	Rheumatism ^[23]
13	Adavi Nimma, Konda Nimma	Lambadas & Erukalas, Krishna District, A.P.	Paste(E)	Scorpion sting area ^[24]
14	-	Malay, Orang, Asli, peninsular Malaysia	Paste(E)	Stomach-ache & Respiratory complaint ^[25]
15	Adavinimma	Tirunelveli, T. N.	-	Ring worm & Parasitic skin infection ^[26]
16	Konda Nimma	Anantapur, A.P.	Paste & Decoction(E&I)	Insect bite ^[27]
17	Konda Nimma	Anantapur, A.P.	Paste mixed with turmeric(E)	Skin diseases ^[27]
18	Kattu elumitchi	Paliyar, Dindigul District, T. N.	Boiled in water & vapour inhaled once in a day for 3 days(E)	Headache & Body pain ^[28]
19	-	Ceylon	Fresh leaves bruised, mixed with salt, heated, and applied(E)	Snake-bite ^[29]
20	-	-	Decoction(E)	Itch & Cutaneous Properties ^[4]
21	Perun-gurundu	Valparai, Periyayakan palyam, Southern Western Ghats, Coimbatore, T. N.	-	Pain, abdominal disorders, fever, cough, vomiting, indigestion & diseases of <i>Vatam</i> ^[30]
22	-	Yanadis, Malayalis, Deccan Region (Odisha, A.P., T.N., Karnataka)	-	Allergies & skin diseases, cough, phlegm, rheumatism, post-natal complaints ^[31]
23	-	-	-	Antiseptic, Antipyretic, Antispasmodic, Stimulant ^[32]
24	Kaadu nimbe	Karnataka, South -West India	-	Fever, Snake-bite Poisoning, Antiseptic, Stimulant ^[33]

Table 3: Ethno-medicinal claims of *Atalantia monophylla* fruit

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Makad-limbu	Marathas, Mhadeo-Koli, Katkari, Dhangars, NWG, Mulshi, Pune, Maharashtra	Juice	Anthelmintic property ^[34]
2	-	-	Juice - Mixed with Rock salt(E)	Itching, Scabies ^[35]
3	-	-	Juice(I)	Gastritis, Headache ^[35]
4	-	-	Juice - mixed with Honey/Jaggery(I)	Cough ^[35]
5	Kattu-elumichai	Valaiyans, Karandamalai, Dindigul, T. N.	Juice - mixed with Honey(I)	Cough ^[36]
6	-	Kothattai & Sendrakillai, Cuddalore, T. N.	Juice(I)	Strengthen the body ^[37]
7	-	-	Oil - mixed with Castor oil(E)	Itching/ Fissuring ^[35]

8	Konda nimma	Anantapur, A.P.	Paste – mixed with castor Oil(E)	Headache [27]
9	-	-	Oil(E)	Arthritis [35]
10	Apassu, Dodampana	Sillalai, Jaffna, Sri Lanka	Oil(E)	Joint Pain [21]
11	Kattu elemitchi	Maruthuvar, Villupuram, T. N.	Oil(E)	Joint pain [22]
12	Gaja nimma	Bagatas, Konda Doras, Valmiki, Gangaraju Mudugula Mandal, Visakhapatnam, A.P.	Oil(E)	Rheumatism [38]
13	-	Gonds, Adilabad, Andhra Pradesh	Oil(E)	Rheumatism [2]
14	Kattu elumichai	Iyarkaikovilkal or Kaavu, Kanya-kumari, Southern western Ghats, T. N.	Oil(E)	Chronic Rheumatism & Paralysis [39]
15	Kattu-naragam	Hoorali & Lingayats, Elanji hills, Sathyamangalam, Western Ghats, T. N.	Oil	Rheumatism [40]
16	Kattu-naragam	Vanavasi hill, Salem, Tamil Nadu	-	Rheumatism [41]
17	Adavi nimma	Palkonda, Srikakulam, A.P.	Oil	Rheumatoid Arthritis [42]
18	Kattu elumichai	Pulayars, Gopalswamy Hills, Coimbatore, T. N.	-	Chronic Rheumatism [43]
19	Kaatu elumichai, kaatupulasai	Thadagamalai, Kanyakumari, T. N.	-(E)	Fungal infection & Rheumatic pain [44]
20	Perun-gurundu	Valparai, Periyanyakan palyam, Southern Western Ghats, Coimbatore, T. N.	-	Pain, abdominal disorders, fever, cough, vomiting, indigestion & diseases of <i>Vatam</i> [30]
21	-	Yanadis, Malayalis, Deccan Region (Odisha, A.P., T.N., Karnataka)	-	Allergies & skin diseases, cough, phlegm, rheumatism, post-natal complaints [31]
22	Kaadu nimbe	Karnataka, South -West India	-	Fever, Snake-bite Poisoning, Antiseptic, Stimulant [33]

Table 4: Ethno-medicinal claims of *Atalantia monophylla* root

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Kattu elumpichai	Malyali, Kolli hills, Eastern Ghats, T. N.	Decoction prepared with root pieces mixed with black pepper in 10-15 ml given orally twice(I)	Cough, Phlegm (Antitussive) [45]
2	Adavinimma, Munkudu	Yanadi, Sriharikota Island, A.P.	Decoction to be prepared with root pieces mixed with black pepper in 10-15 ml given orally twice(I)	Cough, Phlegm (Antitussive) [46]
3	Kattu Elumichai	Malayali, Jawadhu hills Eastern Ghats, T. N.	-	Anti-spasmodic, Rheumatism & Swelling [18]
4	-	-	-(I)	Arthritis, Anti-spasmodic [19]
5	-	-	-	Antispasmodic Stimulant, Snake-bite [11]
6	Kurunthai	Nattu Vaidiya, Sthalavrikshas, T. N.	-	Joint pain [16]
7	-	-	-	Anti-spasmodic, Stimulant, resolvent, Rheumatism, Swelling [4]
8	-	Yanadis, Malayalis, Deccan Region (Odisha, A.P., T.N., Karnataka)	-	Allergies & skin diseases, cough, phlegm, rheumatism, post-natal complaints [31]
9	-	-	-	Antiseptic, Antipyretic, Antispasmodic Stimulant [32]
10	Kaadu nimbe	Karnataka, South -West India	-	Fever, Snake-bite Poisoning, Antiseptic, Stimulant [33]

Table 5: Ethno-medicinal claims of *Atalantia monophylla* berry

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	-	Manalodi & Kinathur, Pachamalai hills Eastern Ghats, T. N.	Oil(E)	Rheumatism [47]
2	-	-	Oil(E)	Rheumatism & Paralysis [9]
3	Karunimma	Jatapu, Gadaba, Samantha, Dumbbriguda Mandal, Visakhapatnam, A.P.	Oil(E)	Rheumatism & Paralysis [48]
4	-	Lankamala hills, Cuddapah, A.P.	Oil(E)	Rheumatism & Paralysis [49]
5	-	-	Oil(E)	Chronic Rheumatism & Paralysis [4]
6	Advi nimma	Gonds, Kolams, Gowari, Kawal region, Telangana	-	Anti-rheumatic [50]

7	-	-	Oil	Anti-bacterial & Anti-fungal property ^[51]
8	-	-	Oil	Anti-bacterial & Anti-fungal properties ^[4]
9	-	-	-(I)	Fever, Loss of taste & Appetite ^[11]
10	-	-	Oil(E)	Paralysis ^[52]
11	-	-	-	Antiseptic, Antipyretic, Antispasmodic Stimulant ^[32]

Table 6: Ethno-medicinal claims of *Atalantia monophylla* seed

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Adavinimma	Parnasala, Khammam District, Telangana	Oil(E)	Rheumatism & Paralysis ^[53]
2	Adavinimma or Munkudu	Yanadi, Sriharikota Island, A.P.	Oil(E)	Joint pains ^[46]
3	-	Paderu, Visakhapatnam, A.P.	Oil(E)	Paralysis & Rheumatism ^[54]
4	Perun-gurundu	Valparai, Periyannayan palyam, Southern Western Ghats, Coimbatore, T. N.	-	Pain, abdominal disorders, fever, cough, vomiting, indigestion & diseases of <i>Vatam</i> ^[30]

Table 7: Ethno-medicinal claims of *Atalantia monophylla* stem bark

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Yerra-munukudu	Chenchu, Yanadi, Erukala, Sugali, A. P.	Decoction to be prepared with stem bark along with <i>Andrographis paniculata</i> , <i>Azadirachta indica</i> , <i>Euphorbia nirvulea</i> boiled in water(I)	Post-natal complaints ^[14]
2	Adavinimma	Chenchu, Yanadi, Yerukala, Nallamalais Eastern Ghats. A. P.	Paste of stem bark mixed with <i>Andrographis paniculata</i> leaf ground in honey, made into paste and give orally with rice water (I)	Post-natal complaints ^[55]
3	-	Yanadis, Malayalis, Deccan Region (Odisha, A.P., T.N., Karnataka)	-	Allergies & skin diseases, cough, phlegm, rheumatism, post-natal complaints ^[31]
4	Koarulimma, Kaarulimma	Minumuluru, Paoeru, Visakhapatnam, A.P.	Paste of root bark or stem bark 2-4 gm. is administered orally with water(I)	Rheumatoid Arthritis, Heart Disease ^[56]

Table 8: Ethno-medicinal claims of *Atalantia monophylla* root bark

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Adavi Nimma, Konda Nimma	Lambadas & Erukalas, Krishna, A.P.	Paste – Ointment(E)	Eczema ^[57]
2	Koarulimma, Kaarulimma	Minumuluru, Paoeru, Visakhapatnam, A.P.	Paste of root bark or stem bark 2-4 gm. is administered orally with water(I)	Rheumatoid Arthritis, Heart Disease ^[56]

Table 9: Ethno-medicinal claims of *Atalantia monophylla* stem

Sr. No	Local names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Narguni	Saora, Chandaka, Odisha	Used as walking stick(E)	Arthritis ^[13]
2	Narguni	Nayagarh, Odisha	Advised as a walking stick(E)	Rheumatism ^[58]

Table 10: Ethno-medicinal claims of *Atalantia monophylla* with unspecified plant parts

Sr. No	Local Names	Tribes/Areas	Dosage form Internal(I)/External(E)	Therapeutic claims
1	Jhambir patri	Gonds, Eastern Ghats (Odisha, Chhattisgarh, A.P., Tamil Nadu, Karnataka)	-	Heart Disorder, Arthritis, Body pain, Fits, Anti-rheumatic ^[59]
2	Munukudu	Yanadi, Nakkala, Irula, Seshachalam Eastern Ghats, A. P.	-	Antiseptic, Fever ^[60]
3	-	Great Andamanese, Andaman & Nicobar	-	Respiratory problem & Rheumatism ^[61]
4	Kurunthai	Nattu Vaidiya, Sthalavrikshas, T. N	Oil(E)	Paralysis ^[16]

“- “Not Reported; Andhra Pradesh (A.P.); Tamil Nadu (T.N.)

It was observed that various therapeutic claims had been reported without noting the exact parts used of the plant. The same therapeutic claims made by different authors with

specific parts used i.e. leaf and this may be considered as the parts used.

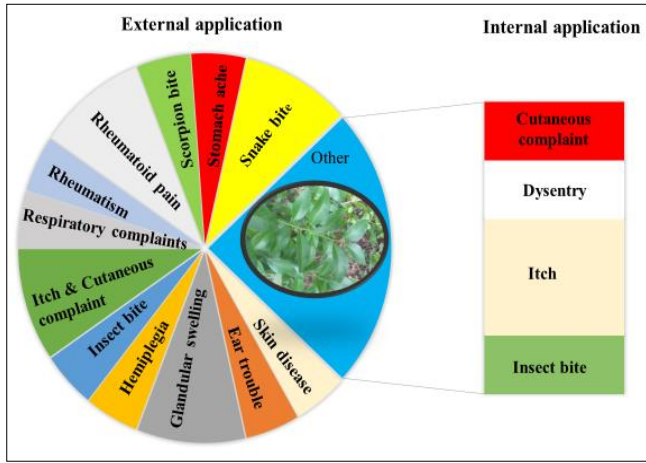


Fig 4: Internal & External applications of Leaf

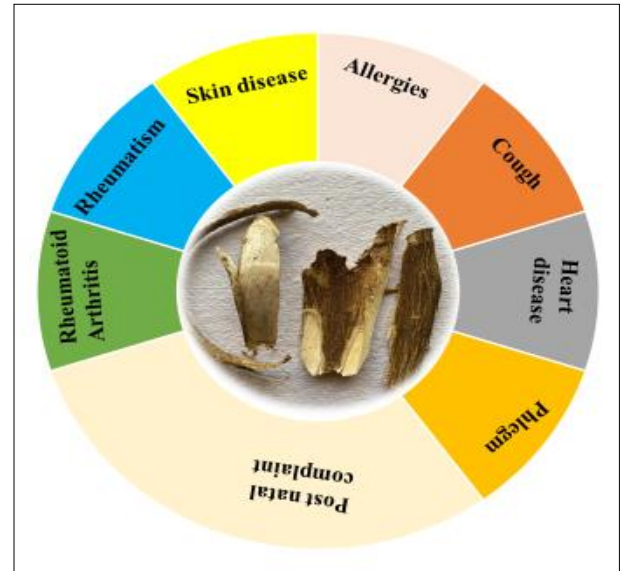


Fig 8: Internal applications of Stem bark

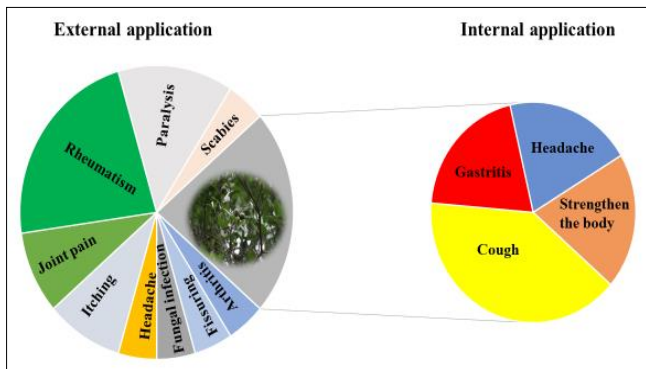


Fig 5: Internal & External applications of Fruit

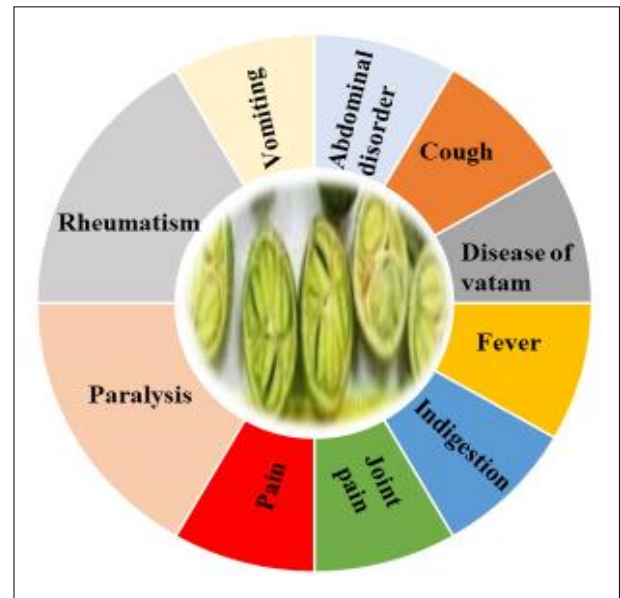


Fig 9: External applications of Seed



Fig 6: Internal applications of Root

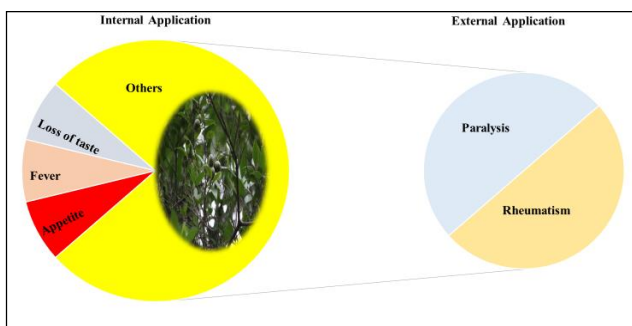


Fig 7: Internal & External application of Berry

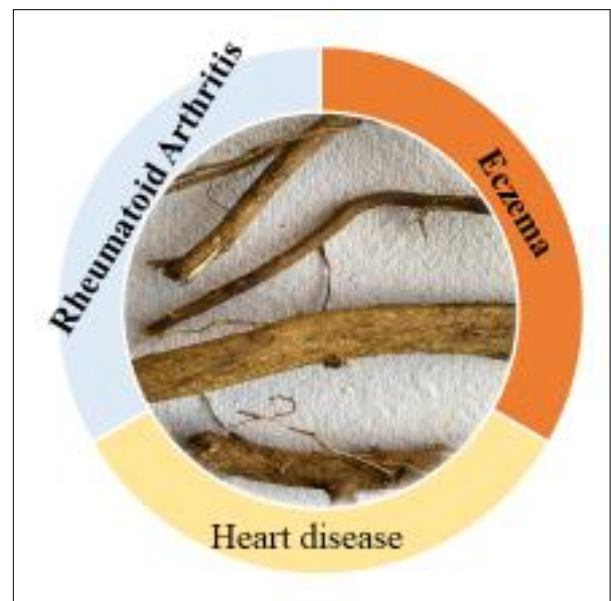


Fig 10: Internal & External application of Root bark

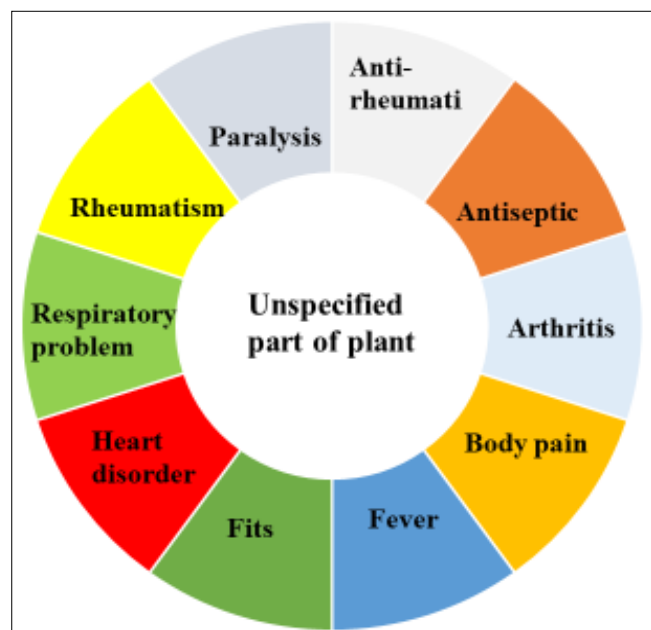


Fig 11: External applications of unspecified plant part

Economical uses

Fruits are used to make a pickle. The yellow wood has been recommended as a substitute for boxwood and could be used for engravings [62]. The wood is hard, heavy, and close-grained of a pale-yellow colour and very suitable for cabinet-work [63].

Recent researches

Phytochemistry

Only a few researches have been reported on pharmacognostical characters of *A. monophylla*. S. Premalatha and A. Karthi [64] reported the presence of carbohydrates, alkaloids, flavonoids, cardiac glycosides, protein and phenolic compound of ethanolic extract of leaves of *A. monophylla*.

Pharmacology study

Different parts of *A. monophylla* have been reported for their Anti-inflammatory, immuno-modulatory, free radical scavenging, anti-microbial, anti-fungal, antioxidant & cytotoxic, anthelmintic, anti-bacterial, ovicidal, larvicidal, anti-genotoxic & apoptotic activities (Table 11).

Table 11: Research updates of *Atalantia monophylla* DC.

Sr. No	Part Used	Ethnomedicinal claims	Extraction medium	Activity reported
1	Root	Rheumatism, Arthritis, Joint pain, Swelling.	Methanol & chloroform	Evaluation of Anti-inflammatory Activity [65]
2		Rheumatoid Arthritis	Ethanol, Ether, Chloroform & Methanol	Immuno-modulatory Activity [66]
3	Stem	Rheumatoid arthritis, heart disease	Ether, Acetone, Methanol, Chloroform	Free radical scavenging activity [67]
4		Rheumatoid pain. heart disease	Ether, Acetone, Methanol, Chloroform	Free radical scavenging activity [67]
5	Leaf	Allergies, Cough, phlegm, ear trouble, fever, body pain, parasitic skin infection	Ethanol, Chloroform, Ethyl acetate	Anti-microbial Activity [64]
6		Ringworm	Aqueous using ammonium sulphate	In vitro Antifungal Activities [68]
7		Rheumatoid pain. heart disease	Aqueous using ammonium sulphate	In-vitro Antioxidant & cytotoxic Activities [68]
8		Abdominal disorder, stomach-ache, indigestion, vomiting, dysentery	Methanol, Ethanol	In-vitro anthelmintic activity [69]
9		Allergies, ear troubles, respiratory complaint, parasitic skin infection	Ethanol	Anti-bacterial activity [70]
10		-	Hexane, chloroform, ethyl acetate	Ovicidal activity [71]
11	Leaf oil	-	Ethanol	Larvicidal activity [72]
12	Essential oil	-	Carbon dioxide & Hydrogen peroxide	Antigenotoxic & apoptotic activities [73]

Conclusion

A. monophylla is one among the promising traditionally used medicine plant found in 3 countries across the globe and 8 states of India, by 60 tribes to combat 55 disease condition. Among the various parts of the plant, leaf, fruits and root are being the most commonly used for 34 external applications and 16 internal administrations. The unspecified plant part and some of the special folklore claims including its used in eczema, paralysis, hemiplegia, fits, heart diseases, respiratory, snake bite, etc. can be taken as leads for future research and further studies. The multifaceted ethnomedicinal claims of the plant need scientific evaluation through pharmacological and clinical studies to establish its ethnic claims.

Consent

It is not applicable.

Ethical Approval

It is not applicable.

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Competing Interest

Authors have declared that no competing interest exist.

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