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Dhava (*Anogeissus latifolia*) : Axle wood from the treasure of *Ayurveda*

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ABSTRACT

Dhava (*Anogeissus latifolia*), Combretaceae family, commonly known as *Bakali* or Axlewood, is a prominent herb in *Ayurveda* which is used as food medicine and other since long ago. This article reviews the various references of *Dhava* in *Ayurvedic* texts regarding its therapeutic uses and different formulations. The review also encompasses the pharmacological activities and various folklore uses of this plant. It is medicinally used in the management of several ailments. Till date this plant has been screened out for activities like as anti-oxidants, anti-inflammatory, hepatoprotective, anti-ulcer, anti-microbial and wound healing activity. This present review article contains spectrum of information about *Anogeissus latifolia* under major heads general information, pharmacognostic, chemical, pharmacological, clinical studies with references.

Key words: *Dhava, Bakali, Hepatoprotective, Wound Healing.*

INTRODUCTION

Dhava is the Sanskrit word referring to धवति पाण्डु धूयते वा प्रमेहादिः अनेन इति ।

'Dhava', is a large to moderate sized tree, common throughout Nepal, Myanmar, Sri Lanka and India in deciduous forests of the Himalayas and South Indian Hills. It is an important medicinal plant used in different Ayurvedic preparation. A brief description about this plant is.

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Taxonomy[2]

Subkingdom: Tracheobionta (Vascular plants)

Superdivision: Spermatophyta (Seed plants)

Division: Magnoliophyta (Flowering plants)

Class: Magnoliopsida (Dicotyledons)

Subclass: Rosidae

Order: Myrtales

Family: Combretaceae (Indian Almond family)

Genus: Anogeissus

Species: *Anogeissus latifolia* (Roxb. Ex DC.) Wall.

Classical Names[3]

Dhurandhara, Dhava, Pishach-Vriksha, Nandi Taru, Dhata, Sdhira, Gaura.

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Vernacular Names[3]

Eng- Button tree, Dindiga tree, Ghatti tree, Axel wood**; Hindi-** *Dhaura, Dhava, Bakali, Dhon*; **Beng-** *Dhaoya, Dhawa*; **Guj-** *Dhavdo*; **Kan.-** *Bejjalu, Dinduge*, *Dindal*; **Mal.-** *Malukkanniram, Vellanava*; **Tel-** *Chirimanu, Tiruman, Cerimanu*, *Sirikarra*; **Arabic-** *Kanti*; **Oriya-** *Dohu, Chobu*; **Raj-** *Goldia, Dhaukra, Dhokri, Dau*; **U.P & North West Himalaya-** *Bakli, Dhauri.*

Table 1: *Ayurvedic* Properties[3]

Properties	P.V Sharma	A.P.I	Data based on medicinal plants
Rasa	*Kashaya*	*Madhur, Kashaya*	*Kashaya*
Guna	*Laghu, Ruksha*	*Ruksha, Guru*	*Laghu, Ruksha*
Veerya	*Sheet*	*Sheet*	*Sheet*
Vipaka	*Katu*	*Katu*	*Katu*
Doshkarma	*Kaph-Pitta Shamka*	*Pitta-Kaphahar*	*Kaph-Pitta Shamka*

Rogaghnata

Kshata, Varna, Shotha, Atisar, Pravahika, Raktarsha, Raktapitta, Raktavikara, Prameha, Kustha.

Karma

Raktarodhaka, Vranaropana, Shotha-hara, Stambhana, Shonita Sthapana, Mootrasanghraniya, Rasayana, Vishaghna

Doses: Decoction- 50 to 100 ml

Gum- 0.5 to 1 gm.

Historical Aspect

Historical aspect of *Dhava* was described in different *Kalas*. It is divided into three *Kala.*

1. *Vedic Kala*
2. *Samhita Kala*
3. *Nighantu Kala*

1. *Vedic Kala*[4]

भद्रातप्लक्षात्रिस्तिश्ठिस्यश्रृत्थात् खदिरात् धवात् ।।

(अर्थव.5/5/958)

2. *Samhita Kala:*

Ayurveda's perfect evolution was seen during the *Samhita Kala.* The *Samhita Kala* is the main landmark in the history of *Ayurveda.*

a) *Charaka Samhita* (1000-1500 B.C):

In *Charaka Samhita Dhava* is not described in any *Mahakashaya.* But it is mentioned in *Sutra, Vimana, Chikitsa Sthana* for treating the disease by the name *Dhava***.**

Table 2: Showing *Dhava* formulation from *Charaka Samhita*[5]

SN	Formulation	Disease / Properties	References
1.	*Siddhtam Churna-Pradeha*	*Kustha, Kilasa, Bhagandar, Arsha, Apachi, Pama*	*Charaka Sutra* 3/3-7
2.	*Kashaya Skandh (Basti)*	*Kapha Evam Pitta Vikara*	*Charaka Vimana* 8/144
3.	*Unnis Balaadi Rasayana*	*Anti-aging* and *Rejuvenation*	*Charaka Chikitsa* 1-2/12
4.	*Amalaka Bramha Rasayana*	*Jra vyadhi prashmnm Buddhi indriya Balpradam*	*Charaka Chikitsa* 1-3/3
5.	*Dwitiya Indrokta Rasayana*	*Sarvaroga Prashmna, Vishaghna*	*Charaka Chikitsa* 1-4/15
6.	*Chandanadi Taila*	*Jwara*	*Charaka Chikitsa* 3/258
7.	*Kapha- Prameha Nashaka Yoga*	*Kapha-Prameha*	*Charaka Chikitsa* 6/27-29
8.	*Vata-Kapha Kusthaghna Lepa*	*Kustha*	*Charaka Chikitsa* 7/125
9.	*Raktarsha Parishechna Yoga*	*Raktarsha*	*Charaka Chikitsa* 14/214
10.	*Khadiradi Lepa*	*Kapha Yukta Visarpa*	*Charaka Chikitsa* 21/88

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11.	*Saptachhadi Yavagu Evam Kwatha*	*Mutra-Krichha*	*Charaka Chikitsa* 26/57
12.	*Uddumbaraadi Taila*	*Yoni Vyapad*	*Charaka Chikitsa* 30/74
13.	*Kariraadi Kwatha*	*Yoni Vyapada*	*Charaka Chikitsa* 30/82
14.	*Shallaki Aadi Sneh Pichhu*	*Yoni Vyapada*	*Charaka Chikitsa*30/108

b) *Sushruta Samhita* (1000 B.C- 5th century AD)

In this *Samhita Acharya Sushrut* mentioned *Dhava* under different *Gana, Agada* and as a *Jala Shodhaka Oushadha* in different *Sthana* for treating disease.

Table 3: Showing *Dhava* formulations from *Sushrut Samhita*[6]

SN	Formulations	Disease/ Properties	Reference
1.	*Rakta Skandana*	*Rakta Ati Pravriti*	*Sushrut Sutra* 14/36
2.	*Vrana Ropana*	*Vrana*	*Sushrut Sutra* 36/28-29
3.	*Saalsaraadi Gana*	*Kushta, Meha, Pandu*	*Sushrut Sutra* 38/12
4.	*Mushkaadi Gana*	*Medo Roga Shukradosha, Pandu.*	*Sushrut Sutra* 38/20
5.	*Daruna Karma*	*Vrana*	*Sushrut Chikitsa* 1/86
6.	*Vrana Ropana*	*Sadhyo Vrana*	*Sushrut Chikitsa* 2/64
7.	*Dhava Ghrit Paka*	*Pittaj Kustha*	*Sushrut Chikitsa* 9/7
8.	*Saalsaraadi Kashaya*	*Maha Kushta*	*Sushrut Chikitsa* 10/3-4
9.	*Sarvamantha Kalpa*	*Maha Kustha*	*Sushrut Chikitsa* 10/ 7-10
10.	*Saalsaraadi Leha*	*Prameha*	*Sushrut Chikitsa* 12/10
11.	*Shilajeet Pryog Vidhan*	*Madhu Meha*	*Sushrut Chikitsa* 13/11
12.	*Kaphaja Vridhi Pralepa*	*Kaphaja Vridhi*	*Sushrut Chikitsa* 19/ 12
13.	*Kaphaja Updansha Lepa*	*Kaphaja Updansha*	*Sushrut Chikitsa* 19/33
14.	*Dhavadi Sidha Taila*	*Shook Dosha*	*Sushrut Chikitsa* 21/ 10
15.	*Ajkar naadi Asthapana Basti*	*Parishrava Vyapada*	*Sushruta Chikitsa* 34/17
16.	*Dushita Jala Shodhaka Oushadhi*	*Jala Shodhana*	*Sushrut Kalpa* 3/9
17.	*Kshara Agada*	*Sarva Visha*	*Sushrut Kalpa* 3/3
18.	*Maha Sugandhi Agada*	*Visha*	*Sushrut Kalpa* 3/22
19.	*Dhavaadi Agada*	*Vishwambhra Visha*	*Sushrut Kalpa* 8/51
20.	*Netra Prasadana Anjana*	*Drishtigat Roga*	*Sushrut Uttartantra* 17/96
21.	*Amrakapithadi Swarasa Poorana*	*Karnagat Roga*	*Sushrut Uttartantra* 21/47
22.	*Dhavadi Taila*	*Pitta Evam Rakta Pratishyaya*	*Sushrut Uttartantra* 24/29
23.	*Palankshaadi Ghrit Paan*	*Revati Bala Griha*	*Sushrut Uttartantra* 31/5

c) *Astanga Samgraha* (6TH century AD):

In this *Samhita, Acharya Vridha Vagbhata* mentioned *Dhava* in different *Sthana* for curing diseases.

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Table 4: Showing *Dhava* formulation from *Astanga Samgraha*[7]

SN	Formulation	Disease	Reference
1.	*Asanaadigana*	*Shvitra, Kustha, Krimi, Pandu, Prameha*	*Astanga Samgraha Sutra* 16/13-14
2.	*Mushkaadigana*	*Gulma, Meha, Ashmari, Pangu, Arsha.*	*Astanga Samgraha Sutra* 16/26
3.	*Netra Tarpana-Put-Paka*	*Netra Roga*	*Astanga Samgraha Sutra* 33/8
4.	*Dhavaadi Kwatha*	*Kaphaja Mutraghaat*	*Astanga Samgraha Chikitsa* 13

d) Astanga Hridaya (8th Century AD)

In this *Samhita Acharya Laghu Vagbhata* mentioned *Dhava* in different *Sthana* for treating diseases.

Table 5: Showing *Dhava* formulation from *Astanga Hridaya*[8]

SN	Formulation	Disease	Reference
1.	*Asanaadigana*	*Shvitra, Kustha, Krimi, Pandu, Prameha*	*Astanga Hridaya Sutra* 15/19
2.	*Mushkaadigana*	*Gulma, Meha, Ashmari, Pangu, Arsha*	*Astanga Hridaya Sutra* 15/32
3.	*Netra Tarpana-Put-Paka*	*Netra Roga*	*Astanga Hridaya Sutra* 24/18
4.	*Dhavaadi Kwatha*	*Kaphaja Mutraghata*	*Astanga Hridaya Chikitsa* 11/12
5.	*Rodhraadi Kashaya*	*Kaphaja Prameha*	*Astanga Hridaya Chikitsa* 12/7
6.	*Mushkaadi Kashaya*	*Kaphodar*	*Astanga Hridaya Chikitsa* 15/68
7.	*Dhavaadi Lepa*	*Kaphaja Visarpa*	*Astanga Hridaya Chikitsa* 18/15
8.	*Chitrakaadi Lepa*	*Kustha*	*Astanga Hridaya Chikitsa* 19/86
9.	*Pindaanjana*	*Linga Naash*	*Astanga Hridaya Chikitsa* 14/31
10.	*Dhavaadi Nasya Taila*	*Pittaja Pratishyaya*	*Astanga Hridaya Chikitsa* 20/12
11.	*Shunthiaadi Rasayana Yoga*	*Vyaadhi- Jra Vimukta*	*Astanga Hridaya Chikitsa* 39/105

3. *Nighantu Kala*

After a long pause, *Ayurveda* was again revived to its glory in *Nighantu* period. *Nighantu* had mainly described *Bahya-Lakshana* means morphological characters of *Dhava.*

Table 6: Showing information of *Dhava* In *Nighantu*[9-13]

SN	*Nighantu*	*Paryaya*	*Guna-Karma*	*Varga*
1.	*Kaiyadeva Nighantu*[9] (15th Cent. A.D)	*Dhava, Nanditaka, Shaktakhya, Bharodvah, Kashaya-Madhur, Tvakka, Sthira, Gaur, Dhurandhar.*	***Rasa*** *- Kashya, Madhur* ***Virya*** *- Sheetal* ***Doshakarma*** *- Kapha-Pittahar* ***Roghanta*** *- Prameha-Pandu Nashaka*	*Oushdha Varga*
2.	*Bhavaprakash Nighantu*[10] (16th Cent. A.D)	*Dhava, Dhat, Nanditaru, Gaur, Dhurandhar*	***Rasa*** *- Madhur, Kashaya* ***Virya*** *- Sheeta* ***Doshakarama*** *- Pitta-Kaphahar* ***Roghanta*** *- Prameh, Arsh, Pandu*	*Vataadi Varga*
3.	*Raj Nighantu*[11] (17th Cent. A.D)	*Dhava, Dradtaru, Gaur, Kashayk, Madhurtwak, Dhavl, Shuklavriksha*	***Rasa*** *- Kashaya, Katu* ***Doshakarama*** *- Kapha-Vata Nashak, Pittaprakopaka*	*Prabhadraadi Varga*

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		, Pandur, Pandutaru	***Roghanta*** *- Deepan*	
4.	*Shaligraam Nighantu* [12] (19th Cent. A.D)	*Dhava, Pishachavriksha, Shaktakhya, Dhurandhar*	***Rasa*** *- Katu, Kashaya* ***Doshaghnta*** *- Kapha-Vata Nashak, Pittaprakopaka* ***Roghanta*** *– Deepan, Pandughna*	*Phala Varga*
5.	*Priya Nighantu*[13] (20th Cent. A.D)	*Dhava, Gaur*	***Rasa*** *- Kashaya, Madhur* ***Virya*** *- Sheeta* ***Doshaghnta*** *- Kapha-Pittashamaka* ***Roghanta*** *- Prameha, Arsha*	*Shraadi Varga*

4. *Chikitsa Grantha - Bhaisajya Ratnawali* (18th century AD)

This *Chikitsa Grantha* was composed by Shri Govind Das ji.

Table 7: Showing formulation of *Dhava* from *Bhaisajya Ratnawali*[14]

SN	Formulation	Disease	References
1.	*Dashvidha Shleshmaj Prameh Yoga*	*Prameha*	*B. Ratnawali* 37/20-22
2.	*Sarjaadi Kwatha*	*Prameha*	*B.Ratnawali* 37/32
3.	*Salsaraadi Leha*	*Prameha*	*B. Ratnawali* 37/56
4.	*Salsaraadi Niryuh*	*Medo Roga*	*B. Ratnawali* 39/58-*65*
5.	*Aaragvadhadi Kwath*	*Kustha*	*B.Ratnawali* 54/64
6.	*Aaragvadhadya Tailam*	*Kustha*	*B.Ratnawali* 54/275

Modern Aspect:

Botanical Description[3]

A tree, upto 33.0 m high. Leaves elliptic-obtuse with red petiole, entire, rounded at both ends. Flowers minute, greenish yellow, in globose heads on short axillary peduncles. Fruits yellowish-brown or reddish-brown, small, shining, beaked, winged, one seeded. Seeds wedge shaped.

Distribution: Sub-Himalayan tract and Shiwalik hills and in the hills throughout India, ascending to 1200m.

Parts Used: Bark, fruit, leaf, gum, root.

Cyclicity[15]

Flowering and Fruiting:

Leaf Fall - February to May

Flowering - June to September

Fruiting - December to March

Reproduction

Propagation Technique - Soak seeds in cold water for 24 hours.

Dispersal

Dispersers: Wind

Pollinators: Bee, Insect.

Ethnobotany[16]

It is important timber and its leave and bark are used for tanning.

Table 8: Showing ethnobotany of *Dhava (Anogeissus latifolia)*

SN	Part of plant	Uses	References
1.	Bark	Anaemic conditions, Urinary discharges, Piles.	K.R Kirtikar. B.D Basu. Indian medicinal plants,1975, vol.2, p.no.268
2.	Bark	Astringent, haemostatics, constipating, depurative and	P.K Warrier. Indian medicinal medicinal plants: A compendium

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		useful in vitiated condition of *Kapha* and *Vata.*	of 500 species,1994;4:381
3.	Bark	Diarrhoea, dysuria, cough, colic, liver complaints, snake bite, skin disease.	S.K Jain. Dictonary of Indian folk medicin and ethnobotany, New Delhi,1991;p.no.225
4.	Bark	Tribals of Udaipur district of Rajasthan uses the bark of the tree in the treatment of fever.	A.Nag, P. Galav, S.S Kateva. Indigenous animal health practices from Udaipur Dist., Rajsthan. Indian Journal of traditional knowledge, 2007,6(4):583-588
5.	Bark	Bark is remedy against cough called 'Dangya Khokala'.	M.V Patil. Ethnobotony of Nashik District.2006;p.no.54.
6.	Bark	Tribal people of forest of Gundlabranhmeswaram wild life sanctuary apply paste of stem bark on scorpion sting.	K.Venkata Ratan, R.R Venkata Raju. Folk remedies for insect bite from Gundlabranhmeswaram wild life sanctuary, Andra Pradesha. Indian jour of traditional knowledge,2008; 7(3); 436-437.
7.	Bark	Decoction of bark is useful against Cough.	S.Pawar,D.A Patil.Ethnobotany of Jalgoan district, Maharashtra.2008;P.no.166
8.	Leaf	Decoction of leaf is useful in Epileptic fits.	S.Pawar,D.A Patil.Ethnobotany of Jalgoan district, Maharashtra.2008;p.no166
9.	Gum	Gum is used as a tonic and generally consumed after delivery.	S.Pawar,D.A Patil.Ethnobotany of Jalgoan district, Maharashtra.2008;P.no166
10.	Gum	Tribes of Satpura hills, use the Gum with cup of water or milk early morning for lactation.	S.D Jagtap, S.S Deokule, P.K Pawar *et al.* Traditional Ethnomedicinal knowledge confined to Pawara tribes of Satpura hills, Maharastra. Ethnobotanical leaflet,2009;13:98-115.
11.	Fruits	Fruit is astringent to bowels and cures *Kapha* and biliousness.	K.R Kirtikar. B.D Basu. Indian medicinal plants,1975, vol.2, P.no.268
12.	Leaf Juice	Leaf juice is given in purulent discharges from the ear.	K.R Kirtikar. B.D Basu. Indian medicinal plants,1975, vol.2, p.no.268

Anogeissus Species[17]

Anogeissus (Combretaceae) includes eight species namely listed in table.

Table 9: Showing botanical name of eight Anogeissus Species [according to Scott (1979) and the plant list 2013)

SN	Anogeissus Species
1.	*Anogeissus . latifolia*
2.	*Anogeissus acuminata*
3.	*Anogeissus bentii*
4.	*Anogeissus dhofarica*
5.	*Anogeissus leiocarpus*
6.	*Anogeissus pendula*
7.	*Anogeissus rivularis*
8.	*Anogeissus sericea*

Pharmacognosy[18]

a) Macroscopic:

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Pieces of bark nearly 4-6 cm in length, 1.5-0.75 cm wide, and 1 or 2 mm thick, recurved, externally pale, hard, recurved, fairly smooth with small ridges, pale brown inner surfaces, smooth but longitudinally striated; fracture clean; faint odour; taste, slightly bitter and astringent.

b) Microscopic:

Mature bark consisting outer 7-9 radially arranged cork cell's layers, followed by 20-24 parenchymatous, thin walled cells of phelloderm , consisting prismatic and rosette crystals of calcium oxalate; secondary phloem wide and characterized by numerous patches of sclereids, sieves tubes, companion cells, fibres, sieve tubes, phloem parenchyma; calcium oxalate crystals, and starch grains are also present in cell which are circular and have centric hilum of size 6 to 13 µm.

Powder - Light brown in colour, bitter, having circular starch grains with size 6 to 13 µm, prismatic and rosettes of calcium oxalate crystals, simple and septate phloem fibers with thin walled, 155 to 200 µm in length, 10-20 µm in width, thick walled fibers having dimensions of 275 to 340 µm length, 9 to 20 µ in width having 6-11 µ wide lumen; various shaped sclerieds with 80 to 235 µm length, and 25 to 75 µm wide. Parenchymatous cells are also present which are usually thin walled.

T.L.C:

T.L.C. of drug's alcoholic extract on silica gel 'G' plate of thickness 0.2 mm using toluene: ethyl acetate (93:7) under UV light 365 nm shows only one fluorescent zone at Rf. 0.10 (greenish). On spraying with anisaldehyde sulphuric acid reagent and heating the plate for 15 minutes at 105°, spots appear at Rf. 0.10 (black), 0.20 (pink), 0.30 (green), 0.34 (blue), 0.40 (green) 0.44 (pink), 0.50 (blue), 0.56 (blue), 0.65 (black), 0.73 (pink), 0.86 (green), 0.93 (blue). T.L.C. of the alcoholic extract in solvent system toluene : ethyl acetate (90:10) and on spraying with vanillin sulphuric acid reagent show spots appearing at Rf. 0.40 (violet), 0.58 (violet), 0.72 (brownish), 0.87 (violet) and 0.98 (violet).

Constituents

Phenolic compounds such as ellagic acid, flavellagic acid, quercetin, myricetin and procyandin along with gallotannins, shikimic acid, quinic acid, amino acids, alanine and phenylanine.

Leaf:[3] Leaf presents a dorsi-ventral structure. Walls of epidermal cells in surface view are wavy. Stomata present only on lower surface and ranunculaceous type. Some of the spongy parenchyma cells and idioblast cells possess rosettes of calcium oxalate crystals. Palisade ratio- 12-21; Stomatal index- 20-29.

Phytochemistry

Table 10: Showing phytochemistry of *Dhava* plant

SN	Compound	Phytochemical	Plant part	Reference
1.	3,3',4-tri-O-methyl ellagic acid	Tannin	Stem bark, Sapwood, heartwood	Reddy et al.(1962) and Reddy et al.(1965b)
2.	Gallotannin	Tannin	Leaves	Reddy et al.(1964)
3.	Gallic acid	Phenolic acid	Leaves	Reddy et al.(1965a)
4.	Chebulic acid	Tannin	Leaves	Reddy et al.(1965a)
5.	Trigallic acid	Tannin	Leaves	Reddy et al.(1965a)
6.	Leucocyanidin	Flavonoid	Stem bark	Reddy et al.(1965b)
7.	Ellagic acid	Tannin	Stem bark, Sap wood	Reddy et al.(1965b)
8.	Quercetin	Flavonoid	Heartwood, root	Reddy et al.(1965b) and Bhargava et al. (2013)
9.	Myriecetin	Flavonoid	Heartwood	Reddy et al.(1965b)

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10.	3,3',4-tri-o-methyl flavellagic acid	Flavonoid	Heartwood	Reddy et al.(1974)
11.	4,3'-tri-O-methyl flavellagic acid-4'-β-D-glucoside	Tannin	Stem bark	Deshpande et al.(1976)
12.	3-di-O-methylflavellagic acid-4'-β-D-xyloside	Tannin	Stem bark	Deshpande et al.(1976)
13.	3,3'-di-O-methyl ellagic acid-4'-β-D-glucoside	Tannin	Heartwood	Deshpande and Patil(1981)
14.	Quercetin-3-O-β-D-galactopyranoside	Flavonoid	Root	Chaturvedi and Saxena (1985)
15.	3-di-O-methylflavellagic acid	Tannin	Stem bark	Govindarajan et al.(2005)
16.	Luteolin-7-O—β- D-galactopyranoside	Flavonoid	Root	Chaturvedi and Saxena (1991)
17.	Luteolin	Flavonoid	Root	Bhargava et al.(2013)

Pharmacological Activities [19]

An overview of the modern pharmacological investigations performed on several crude extracts and isolated compounds from the mentioned *A.latifolia* species are described below:

Antioxidant and Hepatoprotective

Govindarajan *et al.* have tested the antioxidant property of plant extracts and found that it contains good to moderate antioxidant potential. Pradeep *et al.* studied the hepatoprotective activity of hydro-alcoholic extract its activity both in vitro and in vivo. They found that the presence of polyphenols and flavonoids supports its antioxidant potential. The chemical constituents such as high percent of quercetin, gallic acids, rutin and in the extract shows the potent antioxidant activity which is the main causative agents in the hepatoprotective activity of the extract. Quercetin and rutin are also reported to be potential therapeutic agents as they reduce oxidative DNA damage, lipid peroxidation and quench free radicals.

Antiulcer and Antimicrobial Activity

The bark has been tested as anticancer agents. The hydroalcoholic extract is reported to have gastro protective activity, the possible mechanism is due to decreased on SOD and with concomitant increase in catalase activity. The leaf extracts have shown moderate antifungal and antimicrobial activity. These effects are also reported by volatile oil of the plant because of the presence of ellagic acids, gallic acid and its derivatives.

Wound Healing Activity

Govidarajan *et al*. studied wound healing activity of AL extracts and found a decrease in the epithelization period, along with a visibly decreased scar area which justifies the use of *A. latifolia* in Indian traditional systems of medicine for various skin diseases, such as sores, boils and itching.

Antihelmintic Activity

Various extracts of bark and leaf of AL were tested for anthelmintiic activity against earthworm model. All the extracts have moderate to effective anthelmenthic activity. Among all extracts, chloroform extract of bark and pet ether extract of leaf showed potent anthelmenthic activity.

Gum Exudates

The AL plant produces sufficient amount of gum known as Ghatti gum which is gray to reddish gray in color. This gum mainly consists of calcium salts of high molecular weight polysaccharides which on hydrolysis yields arabinose, galactose, mannose, xylose and glucuronic acid. The physicochemical study of this gum

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showed high viscosity which solely depends upon pH of the medium. Kaur *et al.* studied the rheological and structural characteristic of the gum and found that the molecular weight of is approximately 8.94X107 g/mol. The gummy solution at low concentration exhibits pseudoplastic, time dependent shear thickening behavior. Ghatti gum has been extensively evaluated as sustained release polymer due to its high gelling property. Parvathi *et al.* recently studied hypolipidemic activity of this gum.

Antidiabetic Activity

Antidiabetic potential was investigated through streptozotocin-nicotinamide (STZ-NIN)- induced type II diabetes. Aqueous extract of stem bark at 100 and 200 mg/kg was evaluated using glibenclamide (5 mg/kg, orally) as a positive control. Significant changes were seen in body mass, blood glucose level and HbA1c when related to the diabetic control. Plant revealed potent sugar reducing activity (Parvathi *et al.,* 2009c).

Hypolipidaemic

Hypolipidaemic potential was investigated through streptozotocin-nicotinamide (STZNIN)-induced type 2 diabetes model of the aqueous extract of stem bark at 100 and 200 mg/kg, orally using glibenclamide (5 mg/kg, orally) as a positive control. Significant reduction was observed in: cholesterol at 100 mg/kg (124.00 mg/dl) and 200 mg/kg (146.30 mg/dl); triglycerides at 100 mg/kg (130.7 mg/dl) and 200 mg/kg (150.5 mg/dl) in comparison to diabetic control. In case of HDL significant elevation was observed at 100 mg/kg as 29.17 mg/dl and at 200 mg/kg as 26.88 mg/dl when compared to diabetic control. By referring to these values LDL and VLDL calculated which were found to be 55.36 mg/dl and 22.01 mg/dl at 100 mg/kg; 79.75 mg/dl and 25.58 mg/dl at 200 mg/kg, respectively. (Parvathi et al., 2009a).

Cytotoxicity

The cytotoxicity of 95% ethanolic extract of stem bark and leaves were determined in 9 human cancer cell lines including cancers of lung, prostate etc. It was also found that A. latifolia was strongly active against various cell lines with IC50 values ranging from 10.6-28.7 µg/ml, respectively (Diab *et al.,* 2015)

Miscellaneous

50% ethanolic extract of stem bark had shown some gross effects on CNS, hypothermia and responded to amphetamine hyperactivity test (Bhakuni *et al.,* 1971).

Propagation and Cultivation[3]

The tree grows on a variety of geological formation including sandstone, limestone, metamorphic rocks, trap and laterite. It however, grows best in alluvial soils. It prefers a maximum temp. Of 38– 47℃ and a minimum of 0- 15 ℃, annual rainfall 625 to 2250 mm. Light and moisture favors successful germination of seeds. In continuous light germination take place in about 48 hours. The optimum temperature for germination is 35℃. Germination commences about twenty days after sowing and seedling can be transplanted without any difficulty. The growth of seedling is moderate.

Trade and Commerce

Retail market price: Flower powder Rs. 40/ kg. (1999).

Substitutes and Adulterants

Gum ghatti (gum of Anogeissus latifolia) can be used as substitute for Babbula gum (*Acacia nilotica* Delile ssp. Indica (Benth.) Brenan.

Formulation and Preparations: *Sarjadi Kwatha, Dhatakyaadi Taila.*

CONCLUSION

Using modern techniques research on old misconceived ideas and medicinal species new scientific tools can be established in medicine making. There has been an increasing realization that the herbal drugs are effective but also safer and this has led to the spurt in the use of plant based medicine across the world. This review article contains spectrum of information about *Anogeissus latifolia* under major heads general information, pharmacognostic, chemical, pharmacological, clinical studies with references.

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REFERENCES

1. Sri Bapalal G Vaidya, Nighantu Adarsha, Poorvardha, Chaukhamba Bharti Academy, Varanasi, reprint: 2016, page no. 568.
2. https://plants.usda.gov/java/classificationservlet/source=profile&symbol=ANLA13&display=31
3. Database on Medicinal plant used in Ayurveda (CCRAS), Volume-1, page no.127, 128.
4. Atharva Veda- Kanda-5/Laksha Sukta-5, Shloka- 958, page no. 905.
5. Acharya Agnivesha, Charaka samhita, Vidyotni vyakhya commented by Pandit Kashinath Shashtri, Chaukhmba Bharti Academy, Varanasi, reprint: 2015, 1,2.
6. Acharya Sushruta, Sushruta samhita, edited by Dr. Ambika Dutta Shastri, Chaukhamba Sanskrit Sansthana, Varanasi, reprint:2010, Poorvardha and Uttrardha.
7. Acharya Vridha Vagbhatta, Astanga Samgraha translated by prof. K.R. Srikantha Murthy, Chaukhmba Orientalia, Varanasi, print :2005, Vol-1 and 2.
8. Acharya Vagbhatta, Astanga Hridaya edited by Kaviraj Atrideva Gupta, Chaukhamba Prakashana, Varanasi, reprint:2019.
9. Kaiydeva, Kaiydeva Nighantu (Pathya-apathya vibhedika) edited by P.V Sharma and Guru Prasad Sharma, Chaukhamba Orientalia, Varanasi, second edition: 2006, page no. 156.
10. Gyanendra Pandey, Acharya Bhavamishra, Bhavaprakasha Nighantu, Chaukhamba Bharti Academy, Varanasi, reprint:2004, page no.539.
11. Narhari Pandit, Raj Nighantu edited by Indradeva Tripathi, Chaukhamba Krishdas Academy, Varanasi, 3rd edition : 2003, page no. 285.
12. Vaidya Shaligram, Shaligram Nighantu bhushnama, Khemraja Shrikrishnadasa Prakashna Bombay, print: II page no. 520.
13. Priyavrat Sharma, Priya Nighantu, Chaukhamba Subharti Prakashana, Varanasi, print: 2004, page no. 136.
14. Govinda Das Sen, Bhaisajya Ratnawali, Vidyotini tika, edited by Shastri Ambika Dutta, Chaukhamba Sanskrit Sansthana, Varanasi, edition: 2005.
15. https://indiabiodiversity.org/species/show/31049
16. U.H. Patil, Entho-pharmacological Review of a Herbal Drug: *Anogeissus latifolia*, International journal of pharma sciences and research, Vol.2(1),20011,41-43; ISSN :0975-9492
17. http://www.theplantlist.org/1.1/browse/A/Combretaceae/Anogeissus/
18. API Vol-6 Part- I page no.- 75.
19. https://pharmacologyonline.silae.it/files/newssletter/2010/vol2/53.Singh.pdf

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