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Dhava (Anogeissus Latifolia Wall.) Botanical, Chemical And Pharmacological Review Of An Ayurvedic Medicinal Plant

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ABSTRACT: Anogeissus latifolia wall has best antidiabetic activitynowadays there is increase in number of diabetic patients so this drug works magicallyas it contains lots of antimicrobial,antioxidant properties it has natural, ecofriendly source, and no side effects & greater bio availability . Availabilty of Anogeissus latifolia through all over India, Myanmar, Nepal and Sri Lanka, and found throughout tropicalAsia. A tree of tropical and subtropical climates, it is found in deciduous or semi-evergreen forests. It is a common element in teak forests but also occurs in the understorey of dipterocarp forests, in bamboo forests. It is also present in vegetation under semi-arid conditions such as savanna woodland and dry rocky hills. It is usually associated with Albizia lebbeck, Dalbergia spp., Grewia tiliaefolia, Albizia amara, Gyrocarpus jacquini and Mesua ferrea.Cost effectiveness of Dhava bark ash can be used to filter heavy metals and fluoride from water,it can be a low-cost,low maintenance,and environmentally friendly technology. In Digestive system it is Absorbent in nature indicated in Dysentery, Diarrhea, bleeding piles etc.In Circulatory System it is indicated in bleeding disorders. In Excretory system it reduces urine output. decoction of stem used in diabetic condition.

KEYWORD: Ayurvedic drug, Anogissus latifolia wall, Button tree,Dhava, Dhavada,Gumghatti

I. INTRODUCTION:

Natural Products have been prescribed since ages for the treatment of various ailments. Numerous traditional systems of medicine have utilized the potential of medicinal plants. **Anogeissus latifolia wall.(Combretaceae**) is one such herbal drug which finds its place in Ayurveda of medicine. Nature has bestowed this herb with a high versatility due to which it exhibits a wide range of Pharmacological actions of Anogeissus latifolia wall commonly known as **Axle wood tree** or **Dhaura**or **Dhava** is a small to medium sized tree, it is closely related to the **Button tree**.

Cost effectiveness of Dhava bark ash can be used to filter heavy metals and fluoride from waterit can be a low-cost,low maintance and environmentfriendly technology.[1]

NEED & RATIONALEOF THESTUDY:

In this context the basic concepts of ayurveda and Dravyaguna are helpful in treating various aliments which will be helpful to the students of ayurveda and Dravyaguna Acharya Sushrut has described Dhava in Mushkakadi gana which is indicated in the treatment of Prameha. Acharya Charaka has mentioned Dhava in kaphpramehnashak yog and also in treatment of Prameha.Acharaya vagbhata has also mentioned Dhava in Asanadi gana,Rodhradi gana,mushkakadi gana in the treatment of Prameha.

Dhava -Anogeissus latifolia wall fig 1

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II. MATERIAL & METHODS:

Ayurvedic sanhitas vd bapalal- Adarsh nighnatu, acharya priyavat sharma's dravyguna Vigyan vol2,vd Sanjiv lale sir's Ayushdhinamrupvigyan book,website and research papers were referred from view of Dhavaanogeissus latifolia :axle wood from the treasure and many more.

III. OBSERVATION & RESULT

Combretaceae family characteristics:

- There are 480 types of plants in the 16 families of this class. These plants are big trees and thick creeper-like trees.
- The leaves are usually opposite and sometimes alternate or in the form of a circle of 3-4 leaves (verticillate).
- These leaves are simple there are no sub-leaves. The flowers are in the form of a umbel or in the shape of a leather, which are very small.
- The petals of the flower are external and are joined at the bottom and attached to the uterus. Stamens are 4 to 10, rarely seen in more numbers. Anthers are versatile, develop vertically. Pistils are permanent and one-seater of the uterus. Pistil tubercle is simple.
- Fruits, usually with slit-like edges, shaped like small Brinjal .[2]

fig(2)

fig(3)

TAXANOMY[3]

• **Phylum: Spermatophyta**
• **Subphylum: Angiospermae**
• **Class: Dicotyledonae**
• **Order: Myrtales**
• **Family: Combretaceae**
• **Genus: Anogeissus**
• **Species: Anogeissus latifolia wall**

MORPHOLOGICAL CHARACTERISTICS:

- **External morphology:**
- Axle Wood is a small to medium-sized tree, growing up to 20 m tall. It is closely related to the **Button tree.**
- The species name latifolia is in reference to its **wider leaves.**
- Trunk is straight and cylindrical or sometimes more poorly shaped, branchless for 8 m up to 80 cm in diameter.
- Bark is smooth or with scales, pale to dark gray. Branches are **drooping.**
- Leaves are oppositely or nearly- oppositely arranged, simple, entire, with grayish-yellow or whitish hairs below.
- **Stalkless flowers** are borne in dense, spherical heads on stalks in leaf axils or at the end of branches.
- Flowers are small and have parts in fives. Sepals are joined together in a stalk-like tube,

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expanded at top into a 5-lobed cup. There are no petals. Stamens are 10, in 2 rows.

- Fruit is a 2-winged pseudo achene, packed into a dense head. Sepal tube survives till fruiting, and forms a beak.
- Anogeissus latifolia timber gives a heavy hardwood, good charcoal and firewood. It provides a gum that is a good substitute for gum arabic. Its leaves give tannins used for tanning and dyeing. Anogeissus latifolia is used as fodder for cattle, buffaloes .
- Anogeissus latifolia is the most important fodder, fuel and timber tree, and excessive lopping of leaves and cutting of saplings and branches for firewood may cause poor regeneration. In these regions, Anogeissus latifolia may be a major fodder tree for buffaloes in pastoralist communities.[4]

Distribution:

- Anogeissus latifolia is native to India, Myanmar, Nepal and Sri Lanka, and found throughout tropical Asia. A tree of tropical and subtropical climates, it is found in deciduous or semi-evergreen forests. It is a common element in teak forests but also occurs in dipterocarp forests, in bamboo forests. It is also present in vegetation under semi-arid conditions such as savanna woodland and dry rocky hills. It is usually associated with Albizia lebbeck, Dalbergia spp., Grewia tiliaefolia, Albizia amara, Gyrocarpus jacquini &Mesua ferrea.[5]

In India, it grows in most parts of the country except in arid areas and moist areas of North-West India. Anogeissus latifoliagrows up to an altitude of 1200 m, with an average annual temperature of 38-45°C and an average rainfall of 625-2250 mm. It does not tolerate waterlogging.[6]Axlewood (Anogeissus latifolia (Roxb.ex DC.) Wall. ex Bedd.) is a small to medium-sized tree up to 20-36 m tall, with a straight and cylindrical bole up to 80-100 cm in diameter. Its wide leaves (that give it the name latifolia) are opposite or sub-opposite, simple with grayish-yellow or whitish hairs below. The fruit is a 2-winged pseudo-achene, packed into a dense head with a single seed.[6]

▶ **Macroscopic characteristics of Gum Ghatti of Anogeissus latifolia wall.**

❖ **COLOR:** Whitish yellow to amber, sometimes brownish due to impurities.

❖ **ODOUR**: odourless

❖ **TASTE:** Bland taste.

❖ **SIZE:** 1 cm diameter

❖ **SHAPE**: Nodule or spiro.[6]

Fig(4)

Fig(5)

Macroscopic charactersitics of stem bark of Anogeissus latifolia wall.

- Stem-bark : The pieces of dry bark which vary in size are usually 0-9-1-26 cm thick and externally pale-grey, smooth with small ridges at places. The inner surface being pale-brown and longitudinally striated. The bark fractures sharp and complete and has a slight bitter and astringent taste with a characteristic odour.[7]

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Fig(6)

Botanical name of 8 Anogeissus species (according to scott(1979) and the plant list 2013)[8]

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

Anogeissus acuminate
fig 7

Anogeissus pendula
fig 8

Anogeisssus dhofarica
fig 9

Anogeissus leoicarp
fig 10

Anogeissus bentii
fig 11

Anogeissus sericea
fig 12

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HARVESTING/COLLECTION OF GUM METHOD :

- **Tapping :** The trees are not usually tapped for gum. The gum oozes out naturally from the bark through injuries and wounds mostly in summers and is collected manually. In some places artificial incisions are made in the tree bark to increase the gum yield. These incisions are made carefully so as not to permanently injure or kill the tree.
- **Period of harvesting/collection :** Maximum quantity of the gum is collected during the summer months i.e. from March to mid of June. During this time, as the weather gets warmer, the yield increases. Normally the largest crop is picked in April.
- **Yield**: A tree on an averageyieldaround 1-2 kg of gum in a year. Gum yield depends upon the locality, size and vigor of the growth of tee and method of tapping.[9]

PROPERTIES OF GUM:

- The Colour of the gum varies from whitish yellow to amber; though the presence of impurities sometimes imparts a brownish colour to the gum.
- Gum Ghatti is partly soluble in water and forms a colourless mucilage.Gum ghatti is a moderately viscous gum lying intermediate between gum arabic and gum karaya. lt forms viscous solutions at concentrations of about 5% or higher and exhibits typical non-Newtonian behaviour.
- The emulsifying properties of gum ghatti are excellent and considered to be better than gum arabic and thus used in more difficult-to handle systems.
- Gum Ghatti solutions are sensitive to alkali. Viscosity increases sharply with pH upto a maximum at about pH of 8.0 and above that the solutions tend to become above that the solutions tend to become stringy.
- Gum is edible. It is administered as a good tonic to women after child birth. It is extensively use in the pure state in calico printing and in confectionery. It is good stabilizer for ice cream in 0.5% concentration. The gum also finds its applications in the petroleum industry as a drilling mud conditioner.[10]

- **Adultration of Dhava Niryas**.:

Acacia arabica (gum Arabic tree) gum is adultrated.

Fig(13)

fig(14)

How to differentiate Acacia arabica gum from Aniogeissus latifoliagum ghatti?!!!

- Acacia arabica gum and Anogeissus latifolia gum ghatti can be differentiated by their source, water holding capacity, and other properties:
- **Source**: Acacia arabica gumcomes from the branches and stemof the Acacia Senegal tree. Anogeissus latifolia gum ghatti, also known as Indian gum tree or axlewood, comes from the Anogeissus latifolia tree.
- **Water holding capacity**: Acacia arabica gum has a water holding capacity (WHC) of 35 g of water/100 g of gum, while gum ghatti has a WHC of 304.33 g of water/100 g of gum.
- **Color**: Gum ghatti can range in color from whitish yellow to amber, but impurities can make it appear brownish.
- **Solubility**: Gum ghatti is partly soluble in water and forms a colorless mucilage.
- **Viscosity:** Gum ghatti is moderately viscous, falling between gum arabic and gum karaya.
- **Emulsification:** Gum ghatti is a better emulsifier than gumarabic.

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- **Protein content**: Gum ghatti has a higher protein content than gum arabic.[11]

SYNONYMS

1. Dhava (Bh.P)-Its stem is lustrous (having a shaft); 'Dhava' is also a synonym for husband, capable of bearing the burden of the household and the basis of protection of the wife. Just like the husband, the axis of a cart made of the wood of Dhava alsoprotects the cart by being dedicated and basic in bearing the weight of the cart.
2. Dhurandar' (Ni.She.)-Its axis made of wood holds the axle of the vehicle or due to the strength in its wood it is capable of bearing/supporting the load.
3. Marudrav (A.NI.)- Its trees grow in deserts or areas with less water.
4. Guar (A.NI.)-The stem of its tree is of pale yellow colour.
5. Kashaymadhurtwak (KAI.NI.)-The juice of its Stem Bark is Astringent & Sweet.
6. Sthir(Bh.p.)-Its tree is stable due to its being a shaft.
7. Shaktaksh (Sau.)-Its wood is used for making the axis of cart.
8. Shakulaksh(P.R.NI.)-The shape of its fruit is similar to the eye of Sakula (a special fish).
9. *Madhukchhad(*P.R.NI.)-Its leaves are thick like Madhuca (Madhuca longifolia var. latifolia (Roxb.) A. Chev.)
10. Drudhskand(Shivdattamishra)-The stem of its tree is hard.[12]

Chemical composition:

- **Tannins**: The leaves contain 90–95% gallotannins, while the bark contains 12–18% tannins. Young leaves and shoots contain 50% tannins.
- **Acids**: The leaves, bark, and heartwood contain quinic and shikmik acids. The heartwood contains gallic acid and ellagic acid.
- **Triterpenoids**: The plant contains triterpenoids like 3-β-hydroxy-28-acetyltaraxaren and β-sitosterol.
- **Glycosides**: The plant contains glycosides of ellagic and flavellagic acids.[13]

GANA:[14]

Sushruta	Salasaradi gana, Muskakadi gana
Vagabhata	Asanadi gana, Muskakadi gana
Bhavaprakasha	Vatadi varga
Kaiyyadeva Nighantu	Oushadhi varga
Raja Nighantu	Prabadradi varga

EFFECTS:

- *Doshas: Kaphghn Pittaghna*
- *Dhatu:Raktsandhan,Raktmansvroopan*
- *Mala*:*Purish -Stambhan*(Atisaar,*Prvahika*)[14]

IDENTITY,PURITY,AND STRENGHT (Bark).

- Foreign matter-Not more than 2 per cent.
- Total ash -Not more than 11 per cent.
- Acid-insoluble ash-Not more than 1 per cent.
- Alcohol-soluble extractive-Not more than 11 per cent.
- Water-soluble extractive-Not more than 20 per cent.[15]

PHARMACOLOGICAL ACTIVITIES:

- **Antimicrobial**: Extractions from the leaves and bark of the plant have antimicrobial properties.
- **Anti-inflammatory**: Extracts of the plant have anti-inflammatory properties.
- **Antioxidant:** The plant contains compounds with strong antioxidant activity.
- **Hepatoprotective**: The plant has been shown to protect the liver .
- **Antidiabetic**: Some studies suggest that the plant's extracts can help manage diabetes .
- **Anti-ulcer**: Extracts of the plant have been shown to have anti-ulcer properties.
- **Wound healing**:The plant is used in traditional medicine for wound healing.[16]

INDICATION ACCORDING TO MODERN

- Digestive system - Absorbent in nature. Indicated in Dysentery, Diarrhea, bleeding piles etc
- Circulatory System - Indicated in bleeding disorders.
- Excretory system - reduces urine output. decoction prepared out of its stem is indicated in diabetes.

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- Twak - Indicated in skin disorders.
- Satmikarana - Rejuvinative and Anti poisonous - Resin is indicated in Animal poisoning[17].

INDICATION ACCORDING TO AYURVEDA

- ***सुश्रुत***
- 1.*कर्णपूयेमधूकधवशाल्मजम्।पूरणार्थंप्रशंसन्तितेलवातैविपाचितम्।।सुउ. २१-४७.*[18]
- *२. कुष्ठे - खदिरोघवश्वलेपः।चचि. ७-१२१*[19]
- *3. विसर्पखदिरंसप्तपर्णंचमुस्तमारग्वधंधवम्।पृथगालेपनकुर्याद्द्वन्द्वशःसबंशोऽपिवा।।चि. ११-९७*
- ***वाग्भट***
- *४. रसायनार्थम् - धवाश्वकर्णासनबालपत्रसारास्तथापिप्पलीवत्प्रयोज्याःलोहोपलिप्तापृथगेवजीवेत्समाःशतंव्याधिजराविमुक्तः।।उ.३९-१०५*[20]

Formulation according to various Samhita and nighantus

- **Dhava formulation in Sushrut Samhita**[21]

FORMULATION	Disease/properties	Reference
1.Rakta sakandana	Raktati pravruti	Sushrut Sutra 14/36
2.Vrana ropan	Vrana	Sushrut Sutra 36/28-29
3.Salasaradi gana	Kushta, meha, pandu	Sushrut Sutra 38/12
4. Mushkakadi gana	Medorog, shukradosh, pandu	Sushrut Sutra 38/20
5.Daruna karma	vrana	Sushrut Chikitsa 1/86
6.Dhava ghrit paka	Pittaj kushth	Sushruta Chikitsa 34/ 4/11 16.
7.Salasardi kashay	Maha kushtha	Sushrut Kalpa 3/9 17
8.Sarvamantha kalpa	Maha kustha	Sushrut Kalpa 3/3

- **Dhava formulation in Charak Samhita**[22]

1.Siddhatam churna	**Kushta, kilas,bhagandar,arsh,apachi,pama**	**Charaka Sutra 3/3-7**
2.Kashaya sknada(basti)	Kapha evam pitta vikar	Charaka Vimana 8/144
3.Unnis baladi rasayana	Anti ageing and rejuvenation	charaka Chikitsa 1-2/12
4.Amalki brahmi rasayana	Jra vyadhi prshaman buddhi indriya balpradam	Charaka Chikitsa 1-4/15
5. Dwitiya indrokta rasayana	Sarvroga prshamna,vishghna	Charaka Chikitsa 6/27

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6. Chadanadi taila	Jwara	charaka Chikitsa 7/125
7.Kapha prmeha nashak yoga	Kapha prameha	Charaka Chikitsa 3/258
8.Vata kapha kushaghna lepa	kustha	Charaka Chikitsa6/27 28
9.Raktarsha parishechna yoga	Raktarsha	Charaka Chikitsa7/152
10.Khadiradi lepa	Kapha yukta visarapa	Charaka Chikitsa14/214
11.Saptachhadi yavagu evum kwath	Mutra krichha	Charaka Chikitsa 21/88
12.Uddumbaradi taila	Yoni vyapad	Charaka Chikitsa 30/14
13.Kariradi kwath	Yoni vyapad	Charaka Chikitsa 30/82
14.Shallaki adi sneh pichhu	Yoni vyapad	Charaka Chikitsa 30/108

- **Dhava formulation from Astanga Sangraha.** [23]

Formulation	**Disease/properties**	**Reference**
1.Asanadigana	Shivtra,kushta,krimi,pandu	Ashtang Sangraha sutra 16/13-14
2.Mushkakadi gana	Gulma,meha,ashmari,pandu,arsha	Ashtang Sangraha sutra 16/26
3.Netra tarpan put paka	Netra roga	Ashtang Sangraha sutra 33/8
4.Dhavaadi kwath	Kaphaja mutraghat	Ashtang Sangraha chikitsa 13

- **Dhavainformation fromNighantu**[24]

Nighantu	**Parayaya**	**Guna karma**	**Varga**
1.kaiyadeva Nighantu (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

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2. Bhavaprakash ash Nighantu (16th Cent. A.D)	Dhava, Dhat, Nanditaru, Gaur, Dhurandha	Rasa - Madhur, Kashaya Virya - Sheeta Doshakarama - Pitta-Kaphahar Roghanta Prameh, Arsh, Pandu	Vataadi Varga
3. Raj Nighantu (17th A.D)	Dhava, Dradtaru, Gaur, Kashayk, Madhurtwak, Dhavl, Shuklavriksha.	Rasa Kashaya, Katu Doshakarama - Kapha-Vata Nashak, Pittaprakopaka	Prabhadraadi Varga

IV. DISCUSSION :

Kashaya rasa of Dhava Anogeissus latifolia wall is helpful in the shoshan of drav Avastha of dhatus i,e Bahudravashleshma doshas vishesh which is responsible of prameha samprapti. Bahumutrata (polyuria) is the classical symptoms of prameha Kashaya rasa mutrasangrhaniya which helps to stored frequency of urination. This is how it works in and plays magical role in diabetic condition.

V. CONCLUSION:

Anogeissus latifolia is one of the important medicinal plants as since ayurveda in Cardiac disorder, UTI, Skin disorder, Liver complaints, Fever, Epileptic fits etc. as this plant is rich in Pharmacologically active Phenolic phyto-constitute-Ellagic acid. Present review summaries Ethanobotanical, Phytochemical, Pharmacological studies shows that alcoholic extract of stem bark was found to have CNS depressant activity in mice it produced hypothermia and responded to amphetamine hyperactivity test.

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