

**A COMPREHENSIVE REVIEW AND AUSHADHI PRAYOG OF
ACACIA CATECHU WILLD. WITH SPECIAL REFERENCE TO
NIGHANTUS**

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ABSTRACT

Plants are the prime source of ayurvedic medicines. A wide variety of plants are gifted to our nature and maximum of them have significant medicinal properties, we are using them to cure various ailments and diseases since the ancient time. Still many herbs are not explored and need extensive research of them to prove safety and efficacy. One of such well known plant is *Acacia catechu* Willd. which is popularly known as the Khadira & Cutch tree. It is an evergreen tropical tree. Different parts of it are used as medicine as well as it is also proven to have Antimicrobial, Anti-diabetic, Antibacterial, Antidiarrheal, Antipyretic, Anti-inflammatory and hepatoprotective activities etc. It is also useful in treatment of skin disorders, diabetes, diarrhoea, fever, rheumatism, worm manifestation etc. It is reported that it contains

various alkaloids, flavonoids and phenolic compounds which have conferred this plant with plentiful amount of medicinal potential. Vedas and various ancient ayurvedic Samhitas like Charaka Samhita, Sushrut Samhita, Nighantu Granthas viz. Dhanvantari Nighantu, Raj Nighantu, Madanpal Nighantu, Shaligram Nighantu, Kaiyadeva Nighantu, Bhavprakash Nighantu, had described *Acacia catechu* Willd and its ayurvedic properties and therapeutic

uses in detail. This present review article extensively deals with compilation of the information regarding Khadir from ancient literature and latest discoveries.

KEYWORDS: Review, *Acacia catechu*, Khadira, Nighantu, Pharmacological activities.

INTRODUCTION

Our Healthcare system mainly depends on Physician, Medicine, Nurse and Patient. Among them medicine plays a most important role in preventive and curative approach. Now ayurvedic medicine has become popular and an integral part of our Healthcare system, as they are used both traditionally as well as in on-going scientific research work. Ayurvedic medicines are rich in natural substances that can promote our health and prevent us from getting ill. In Ayurveda, many herbs are enlisted to cure different ailments. The plant *Acacia catechu* also known as catch tree or Dita Bark tree belonging to Fabaceae family, has been used in Ayurveda for the treatment of various diseases and ailments of human being.

According to Rigveda, Khadira is one of the important trees both of rituals and medicinal usage "अभिव्ययस्वखदिरस्यसारभोजोधिहिस्पन्दनेशिंशपायाम्"।ऋ.वे.३/५३/१९).

It is described with the synonym 'Vibadha'. Its heartwood is considered to be very strong and is used as wedge while manufacturing chariots. Satapatha Brahmana mention it as one of the strongest trees and strength of its stem is simile to the bone in strength. Khadira was used as fire wood and as vessel/container.

The extract of heart wood (Khadirasara) is used for external wearing like precious stone. In Paippalada Samhita it is specifically quoted in the treatment of leucoderma (Kilasa) and poisoning cases (Viṣa roga).

Ayurvedic texts quote Khadira twing as the best among the tooth brush which is astringent (Kaṣaya) in taste. Caraka described it as the best drug for Kuṣṭha (skin diseases). Kuṣṭhaghna term is used by Caraka at once but it is considered to be Cakramarda. Gayatri is the synonym used by Susruta and Vagbhaṭa. Another name Balapatra was mentioned by Vagbhaṭa alone. In one context Suśruta described 'Gāyatrya' denoting one of the varieties of Soma but not Khadira. Vāgbhata emphasized its utility as tooth brush. Cakradatta describes Khadira in the treatment of Svarabheda.^[1]

BOTANICAL NAME- *Acacia catechu* Willd.

TAXONOMICAL CLASSIFICATION

- ❖ **Kingdom:** Plantae;
- ❖ **Subkingdom:** Tracheophyta;
- ❖ **Superdivision:** Spermatophyta;
- ❖ **Division:** Equisetopsida;
- ❖ **Order:** Fabales;
- ❖ **Family:** Fabaceae;
- ❖ **Genus:** Acacia;
- ❖ **Species:** *Acacia catechu* Wild.

**Showing Leaves, Flowers, Fruits & Bark of Khadir**

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CLASSICAL NAMES

Khadira, Balpatra, Bahushalya, Dantadhawana, Raktasara, Yadniya, Gayatri.

VERNACULAR NAMES

- ❖ **Eng.**- Cutch tree;
- ❖ **Hindi** - Khair;
- ❖ **Beng.** - Khayar;
- ❖ **Guj.**- Kherio baval, Khair, Kathe, Kher;
- ❖ **Kan.**- Kalu, Kachu, Kaggali, Kanti, Kaggalinara, Kachinamara, Koggigida;
- ❖ **Mal.** - Karingali, Khadiram;
- ❖ **Mar.**- Kaderi, Khair,
- ❖ **Punj.**-Khair, Tam.- Karunkali, Kadiram, Karngalli;
- ❖ **Tel.**- Podalimamu, Kaviri, Kachu, Kadiramu, Sandra,
- ❖ **Assam**- Kharira, Khara, Khayar, Khorra, Kash. Kath,
- ❖ **Kon.** -Kathu;
- ❖ **Oriya** - Khoiru, Khaira,
- ❖ **Urdu** - Chanbe kaath.^[2]

NAMARUPA VIJNANA (SYNONYMS)

१. खदिरः (भा०)-खदतिस्थिरंतिष्ठतिहिनस्तिवरोगानिति; 'खदरथैर्येहिंसायां व' ।
२. कण्टकी (भा०)-कण्टकाः सन्त्यस्या
३. कुष्ठघ्नः (अ०)-कुष्ठं हन्तीति।
४. गलरोगनुत् (सो०)-गलरोगनाशकः
५. गायत्री (भा०)-गायन्तं त्रायते, यज्ञे प्रयोज्यत्वात्, गलरोगेहितत्वाच्चा
६. जिह्मशल्यः (सो०)-जिह्माः वक्राः शल्याः कण्टका अस्य।
७. दन्तधावनः (भा०)-दन्तधावने प्रयुक्तत्वात्।
८. बहुशल्यः (भा०)-बहवः शल्याः कण्टका अस्य।
९. बालपत्रः (भा०)-ह्रस्वपत्रत्वात्।
१०. मेदोघ्नः (सो०)-मेदोहरः।

११. यज्ञियः (भा०)-यज्ञेप्रयुज्यमानः।

१२. रक्तसारः (भा०)-रक्तवर्णः सारोऽस्या

१३. सारद्रुमः (रा०)-सारवान्वृक्षः।^[3]

Khadira (*Acaciacatechu* Willd.) is a wild thorny tree (kantaki, bahusalya), the spines being curved (jihmasalya). Wood is regarded as holy and used in sacrifices (gāyatrī, yajñiya). It has firm and red heart-wood (sāradruma, raktasāra) and small leaves (bālapatra). Twigs are used as tooth-brush (dantadhavana). Khadira is a specific drug for leprosy (kusthaghna) and is also efficacious in obesity (modoghna) and disorders of throat (galaroganut).

LITERATURE REVIEW

VEDIC PERIOD

In the Vedas this drug is mentioned as Khadira. During the Vedic period the drug was widely used for: 1. Krimi nashana (as anti-bacterial drug) 2. Bal, Veerya (as rejunvative) and 3. Bhuthi Manibandhan (as amulet) The Atharvans considered the drug as most potential anti-bacterial drug. The niryas (gum resin) of this drug also described as anti-bacterial. In one context the Atharva Veda III: 6-1 reveals that the most potential man can give birth to potential children in the similar manner the Ashwatha which grow on Khadira is also most potential drug. In Rigveda III the usage of Khadira as Manibadhan for Graha dosha and Bhrihaspathi, Savitha, Chandrama, Varuna and also for the improvement of ojas has been given.^[4]

SAMHITA PERIOD

In Charaka Samhita (3rd century.B.C.) The medicinal plants have been classified according to Karma (action) and prabhava (specific action). Charaka mentioned Khadira in the Kushthagna, Kashaya Kskandha gana (the group of drugs that were used for skin disorders, mainly for Kushtha and as Vrana ropana dravyas in the treatment of Vranas) Charaka Samhita refers to use of this drug for various conditions such as: 1. For the management of Raktapitta (Haemothermia) and prameha (Urinary anomalies). 2. Visahara, Agada and as anti-dote to Nakha Danta visha.^[5,15]

Chakrapani (1040 AD.) Described the drug for wide range of uses 16. Such as 1. In hoarseness (swar bheda), Khadira rubbed with oil (Til Tail) is recommended to be kept in the mouth. 2. In oral diseases, in the form of swalpakhadira vatika. 3. In skin diseases, externally and internally. 4. As Shodhana (wash) for inflamed parts and ulcers in the form of

decoction. 5. In the form, of arishtha for internal use in boils, measles and other skin disorders.^[5]

Sushruta (6th century B.C.) Classified the drugs according to actions, odour and taste. The Khadira has been described in Salsaradil gana (the group commenced with Salsara, Ajakarna, Khadira etc. These drugs cure Kushtha (obstinate skin diseases including leprosy), Meha (obstinate urinary disorder including Diabetes), pandu (Aneamia). These drugs also cleanse kapha and medas (Fat). Sushruta mentioned following therapeutic uses of Khadira. 1. as Rasayana for the treatment of prameha (urinary disorders including Diabetes) and Raktapitta (Haemothermia)/ 2. as Krimihara for the management of Kushtha (obstinate skin disorders including leprosy) and Vranasf 3. as Kaphara in the shwasa, kasa, swarbheda 7. In Sushruta Samhita the drug khadira was described as Kadar, Kushthghna,. Gayathri, Rakthasar etc. According to Dalhana Kadar is like Khadira with yellow wood (Apeethasarah Khadirakarah). But it is usually said to be shweta khadira, which may be other species of Acasia, i.e. Acassia suma Buch.^[6,16]

Table No. 1- Synonyms of Khadira from various Nighantus.^[17,18,19]

SYNONYMS	AH	AV	BR	BP	CS	DN	KN	RN	RV	SN	SLN	SS
1. Balapatra	+	-	-	+	+	+	-	-	-	+	+	-
2. Brahma shalya	-	-	-	-	+	-	-	-	-	-	-	-
3. Bahushalya	-	-	-	+	+	-	+	-	-		+	-
4. Danta Dhavana	-	-	-	+	+	+	-	-	-	+	+	-
5. Dwija Priya	-	-	-	-	+	-	-	-	-	-	-	-
6. Gayatri	+	-	-	+	+	+	+	-	-	+	+	+
7. Gita	-	-	-	-	-	-	+	-	-	-	-	-
8. Gourat	-	-	-	-	-	-	+	-	-	-	-	-
9. Hima Shalya	-	-	-	-	+	-	-	-	-	-	-	-
10. Homa	-	-	-	-	+	-	-	-	-	-	-	-
11. Jihwa Shalya	-	-	-	-	+	+	-	-	-	+	-	-
12. Khadira	+	+	+	+	-	+	-	-	+	+	+	+
13. Kadara	+	+	-	-	+	-	-	-	+	-	-	+
14. Kushthaghna	-	-	-	-	-	-	+	-	-	-	-	+
15. Kantaki	-	-	-	+	+	+	-	-	-	+	+	-
16. Kushtha hrit	-	-	-	-	+	-	-	-	-	-	-	-
17. Kantari	-	-	-	-	-	-	-	+	-	-	-	
18. Kshatha Ksheena	-	-	-	-	+	+	+	-	-	+	-	-
19. Karmuka	-	-	-	-	+	-	-	+	-	-	-	-
20. Kubja Kantaka	-	-	-	-	+	-	-	+	-	-	-	-
21. Kandu	-	-	-	-	-	-	-	+	-	-	-	-
22. Kushtha Kantaka	-	-	-	-	-	-	-	+	-	-	-	-
23. Kalskanda	-	-	-	-	-	-	-	+	-	-	-	-
24. Khadiropam	-	-	-	-	-	+	-	-	-	-	-	-

‘+’ indicates present & ‘-’ indicates absent

A.H= Astanga Hridaya, B.R.= Bhaisajya Ratnavali, CS= Carak Samhita, RN= Raj Nighantu, DN=Dhanwantari Nighantu, MN= Madanpal Nighantu, KN= Kaiodev Nighantu, PN= Priya Nighantu, Ni.A= Nighantu Adarsha, SN= Saligrtam Nighantu, Ma. N= Madhava Nidana SS= Sarangadhar Samhita

BOTANICAL DESCRIPTION

Acacia catechu Willd. is a medium sized thorny deciduous tree upto 3- 15 m high; stem straight and grayish brown, bark dark grey to dark grayish brown, exfoliating in narrow strips brown and red in side.

The leaves are bipinnately compound, with 9-30 pairs of pinnae and a pubescent glandular rachis; leaflets 16-50 pairs, oblong-linear, 2-6 mm long, glabrous or pubescent with a pair of short, hooked shape, recurved prickles or spines at the base of the rachis.

Inflorescence cylindrical, axillary pedunculate spike. Flowers are actinomorphic to zygomorphic, 5-10 cm long, sessile, pentamerous, creamy whitish to pale yellow and with a campanulate calyx of 1-1.5 mm length, and a corolla of 2.5-3 mm length. Stamens are numerous and far exerted from the corolla, with white to yellowish white filaments, bisexual and have single superior carpel; pod is one chambered legume, glabrous oblong, 3-10 seeded, straight, flat and brown in colour with triangular beak at the apex, shiny, narrowed at base.

A. catechu heartwood is light, red, turning brownish red to nearly black with age and attached with whitish sapwood. The fracture is hard, odour, characteristic and taste is astringent. The gummy extract of the wood is called katha or cutch which is mostly shining black or brownish mass, hard and brittle, and breaks easily. The fractured surfaces show brownish color but dull gloss and small cavities. It gives dull brown fine odorless powder having strong astringent taste.^[7]

DISTRIBUTION

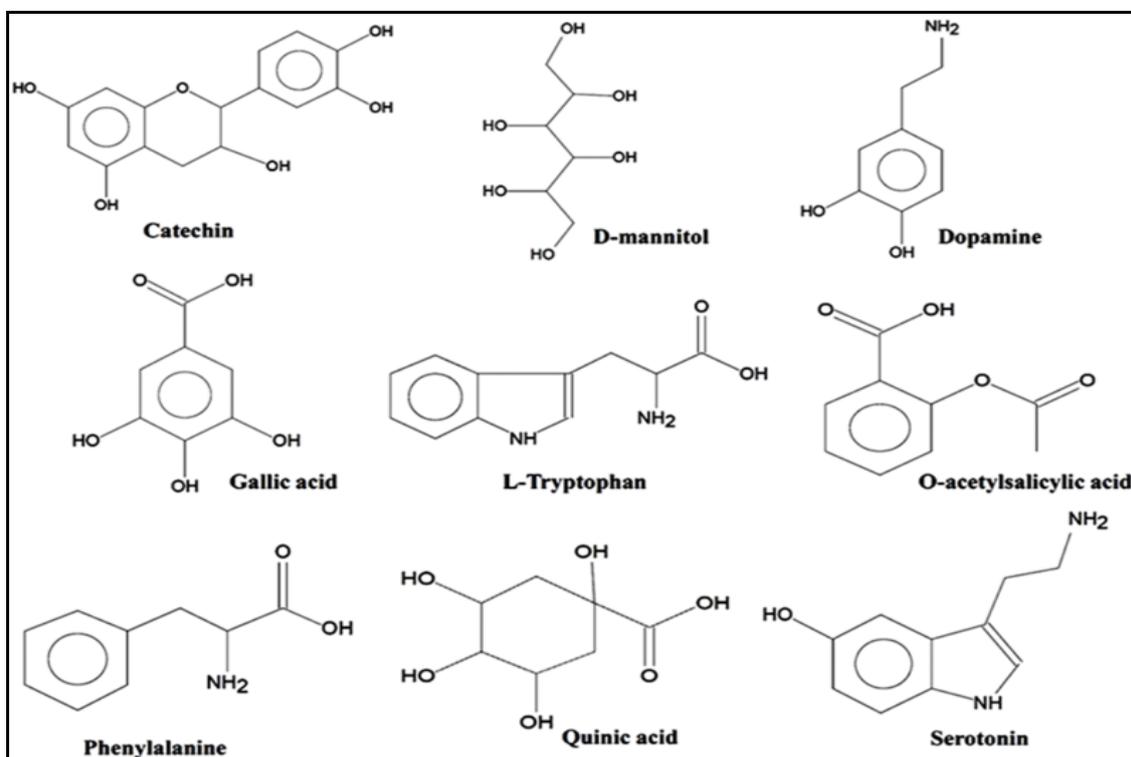
Throughout the Sub-Himalayan tract of Punjab to sam ascending to 1200 m., Peninsular region, particularly in drier parts, Madhya Pradesh, Maharashtra, Gujarat, Bihar, Rajasthan and Tamil Nadu. Also in Eastern slopes of Western Ghats.^[2]

DIFFERENT VARIETIES

In the Samhitas 'Khadira' and 'Kadara' are described which are *A. catechu* and *A. suma* Buch respectively. In Dhanvantari Nighantu two varieties Khadira and Sōmavalka are described while Rāja Nighaṅṭu quotes five varieties viz., Khadira, Somavalka, Tamrakaṅṭaka, Vitkhadira and Arimeda. Amarakosa mentioned three varieties viz., Khadira, Viṭkhadira & Sāmavalka. We come across description of 'Vallī Khadira' in Nighaṅṭu Ratnākaram. Bhavamisra quoted Khadira, Kadara and Irimeda. There are three varieties which are commonly used today. They are: *A. catechu*; *A. sundra* and *A. catechuoides*.^[8]

CHEMICAL CONSTITUENTS

B- sitosterol, 4a, 5a- oxidoeudesm- 11- en- 3a- ol from (rhizomes); pinene, cineol, alcohol-isocyperol (essential oil from the tubers); linolenic, linolic, oleic, myristic and stearic acids and glycerol (fatty oil); a sesquiterpeneketone Mustakone and copaene, cyperotundone, sesquiterpenes- (+)- copadiene, (+)epoxyguaine, (-)- rotundone and cyperolone; cyperenone designated as isopatchoul- 4(5)- en- 3- one and aureusidin (essential oil); two sesquiterpenic ketoalcohols, a- rotunol, B- rotunol, kobusone and isokobusone; oleanolic acid and its glycoside, oleanolicacid- 3- (- neohesperidoside alongwith sitosterol, sesquiterpenes- a- cyperone, cyperene, B- selinine and cyperenone (tubers); luteolin and aureusidin (leaves).^[9]



Chemical constituents of Khadira

ACTION & USES

The bark is used in melancholia, conjunctivitis and haemoptysis. Heartwood is bitter, astringent, acrid, cooling, depurative, anthelmintic, antiseptic, antidystenteric, antipyretic, appetiser, haemostatic, antiinflammatory and tonic. It is used in catarrh, cough, pruritus, leprosy, leucoderma, skin diseases, helminthiasis, anorexia, diarrhoea, dysentery, foul ulcers and wounds, haemoptysis, haematemesis, haemorrhages, fever, anaemia, diabetes and pharyngodynia. The catechu (kattha) is acrid, bitter, thermogenic, digestive, appetiser, aphrodisiac, vulnerary, anthelmintic, depurative and tonic. It is used in laryngopathy, flatulence, ulcers, wounds, leprosy, skin diseases, urine incontinence, and colporrhagia. A small piece of catechu with cinnaom and nutmeg is held in toothache, loss of voice etc, also in cases of mercurial salivation, hoarseness, relaxed sore throat, bleedingulcerations and sponginess of gums. It is used for bed sores. Catechu in the form of injection is useful in treatment of gonorrhoea, otitis, otorrhoea.^[10]

AYURVEDIC PROPERTIES

- ❖ **Rasa**– Tikta, Kashaya
- ❖ **Guna** – Laghu, Ruksha
- ❖ **Veerya** – Sheeta
- ❖ **Vipaka**– Katu
- ❖ **Prabhava** – Kushthaghna
- ❖ **Doshagnata**– Kaphapittashamaka
- ❖ **Rogagnata**– Aruchi, Atisara, Kaphaja kasa, Prameha, Kushtha, Twakaroga, Jeernajwara, Raktapitta, Krimi. Karma – Ruchivardhaka, Stambhana, Shonitasthapana, Mutrásangrahana, Kushthaghna, Kandughna, Vrana ropaka.^[2]

Table 2: Rasapanchaka of Khadira From Various Nighantus.^[17,18,19]

		DN	MN	RN	KN	BH.N	SHA.N	NA	SN	PN
RASA	Tikta	+	-	+	+	+	+	+	+	+
	Madhura	-	+	-	-	-	-	-	-	-
	Kasaysa	-	-	-	-	+	+	+	+	+
GUNA	Laghu	-	-	-	-	+	-	-	-	-
VIRYA	Sheeta	+	+	+	+	+	-	+	-	+
	Ushna	-	-	-	-	-	+	-	+	-
VIPAKA	Katu	-	-	-	-	-	+	+	-	-
PRABHAVA	Kushthaghna	-	-	-	-	-	-	-	-	+

‘+’ indicates present & ‘-’ indicates absent

RN= Raj Nighantu, DN=Dhanwantari Nighantu, MN= Madanpal Nighantu, KN= Kaiodev Nighantu, PN= Priya Nighantu, Ni.A= Nighantu Adarsha,SN= Saligrtam Nighantu, Ma. N= Madhava Nidana.

PHAMACOLOGICAL ACTIVITIES

Antimicrobial Activity

Study showed Acacia catechu Willd leaves Extract is found to possess broad-spectrum antimicrobial activity Results showed AC has antimicrobial activity by inhibiting common human pathogenic organisms like Staphylococcus aureus (Gram positive), Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, and Salmonellatyphi (Gram negative) and fungi like Candida albicans, Aspergillus niger supporting its use in traditional medicine. Acacia catechu Willd leaves, Bark, root extract also possess Anti mycotic activity . The bark extract showed an inhibitory effect on the growth of fungi such as Piricularia oryzae and Colletotrichum falcatum.^[11]

Antioxidant Activity

Study of 70% methanol extract of heartwood extract of Acacia catechu showed significant antioxidant activity, iron chelating and DNA protective activity which is partly due to the phenolic and flavonoid compounds present in it Standard methods like The dot?blot assay, TLC study and the DPPH assay showed that the AC extract is a highly effective antioxidant. Catechin, rutin and isorhamnetin are reported as free radical scavengers and these compounds largely contribute to the biopotency of Acacia catechu.^[12]

Antidiarrheal Activity

Antidiarrhoeal activity was evaluated in albino rats after inducing diarrhea with castor oil.1 The antidiarrhoeal property of the ethyl acetate extract of Acacia catechu appears to be due to its tannin content, which has astringent property.^[12]

Antipyretic Activity

The antipyretic effect of Acaciacatechu is due to presence of flavonoid compounds, as some flavonoids are predominant inhibitors of cyclooxygenase or lipooxygenase.^[12]

Hypoglycaemic Activity

Acacia catechu possess hypoglycaemic activity. The hypoglycaemic effect of A. catechu may be due to presence of flavonoids which acts as insulin secretagogues. Epicatechin, a

flavonoid compound, is reported to promote regeneration of β cells of the Islets of Langerhans.^[13]

Hepatoprotective activity

Acacia catechu also possesses hepatoprotective property found in the heartwood. During trials, an ethyl acetate extract in male rats decreased CCl₄-induced elevated enzyme levels in acute and chronic models of liver damage. The results indicated some form of repair of the structural integrity of the hepatocyte cell membrane or regeneration of damaged liver cells. Decreased levels of serum bilirubin after treatment with the extract in both acute and chronic liver damage indicated the efficacy of the extract in restoring normal functional status of the liver and the protective action of the extract was further substantiated by histopathological observations. The hepatoprotective activity of *A. catechu* could be due to the presence of bioflavonoids which have hepatoprotective and antioxidant properties.^[12]

Immuno modulatory activity

Study on Wistar albino rats shows that the aqueous extract of *Acacia catechu* have significant effect on both the cell mediated and the humoral immunity. The exact constituent(s) responsible for the immunomodulatory effect is not known. However, the catechins, by virtue of their antimicrobial, anti-inflammatory, antiviral, and antioxidant effect may be the main constituents responsible for their activity.^[12]

PARTS USED- Bark, heartwood^[2]

DOSE-

Powder of bark-1-3gm

Decoction-50-100ml

Heart wood-0.5-1gm^[2]

IMPOTANT PREPARATION''^[14]

Khadiradi vati

Khadiraristha

Khadiradi tailam

Amritastaka

Astangadasangalanha

Kusthakalamla rasa,

Kustha shailendra rasa,

Krimivinasana rasa,
Arshoghnivati
Palosabijadi churna
Kasisadi grita
Jatyadi grita
Nimbapatradi upnaha

CONCLUSION

Acacia catechu is a deciduous, gregarious tree. It is very common tree of Aligarh, Uttar Pradesh, India. The review on Khadira traces out from the Vedas to modern literature text and research. It has many medicinal properties, which can be used to cure or helps to reduce many ailments like Skin disorders, diabetes, worm manifestation, liver disorders, ulcers, fever etc. It has ayurvedic properties like Tikta, kshaya in rasa, Laghu, ruksha in guna, Sheeta in virya, Katu in vipaka and Kapha-pitta shamak in doshakarmata. This medicinal plant has long being researched for its phytochemicals and its pharmacological activities. The plant also contains various chemical constituents mostly Catechin, kaempferol, Rutin, Ferulic acid, caefflic acid, saponins and tannin etc. Many parts of this plant has been used in traditional systems of medicines for treating various ailments due to its Antimicrobial, Anti-diabetic, Antibacterial, Antidiarrheal, Antipyretic, Anti-inflammatory and hepatoprotective activities etc. Further research is required to evaluate the plant's active potential as drugs or medicinal purpose.

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