Vol 7 | Issue 1 | 2016 | 23-28.

e - ISSN 2249-7544
Print ISSN 2229-7464

INTERNATIONAL JOURNAL
OF
PHYTOPHARMACY RESEARCH
www.phytopharmacyresearch.com

A REVIEW ON SENEGALIA CATECHU (*Acacia catechu* willd)

DK Sanghi[1] and Rakesh Tiwle*

[1]Principal, Shri Laxmanrao Mankar Institute of Pharmacy, Amgoan, Gondia, Maharashtra, India- 441902.
*Research Scholar, Shri Laxmanrao Mankar Institute of Pharmacy, Amgoan, Gondia, Maharashtra, India- 441902.

ABSTRACT

Acacia catechu willd is a historical plant has a valuble importance because of its medicinal properties. It is obtain in Myanmar, Nepal, Pakistan, Thailand Indonesia, Kenya, Mozambiqu, india, in india it is found in Asia, China, India and the Indian Ocean. Now a days hypoglycaemic activity, antimycotic, has also been reported. Phenols or Polyphenols are the natural chemicals which are found in *Acacia catechu.* The generic name, 'acacia', comes from the Greek word 'akis', meaning a point. The species name comes from 'cutch', a tanning extract isolated from its heartwood. The main chemical constituents of Black catechu contain epigallocatechin, flavanoids catechin, (-) epicatechin, epicatechin gallate, epigallocatechin gallate, rocatechin, procatechuic acid, quercetin, quercitrin, catecutannic acid, (+)-afzelchin gum), glycosides (Poriferasterol, poriferasterol seeds of the plant are reported to possess hypoglycemic activity in rats acylglucosides), phloroglucinol, alkaloids (kaempferol, dihydrokaempferol, taxifolin, tannins (gallic acid, phlobatannins), sugars (d-galactose, d-rhamnose and l-arabinose). It also posed multifarious medicinal properties such anticancer, anti-ulcer, antimicrobial, anti-bacterial, antioxidant, antipyretic, hepatoprotective, hypoglycaemic, anti-diarrhoeal, antisecretory, anti-inflammatory, sore throat and wound healing. This rivew give detail information regarding *Acacia catechu willd*.

Keywords: Catechin, Wound Healing,Kathha, Hypoglycaemic, Anti-Ulcer Activity, Anti Mycotic Activity.

INTRODUCTION

Ayurveda is also known as, Ayurvedic medicine. "Ayurveda" combines with Sanskrit words Veda (science or knowledge) and ayur means (life). [1] Thus it is the science of life. *Acacia catechu willd* is a historical plant has a valuable importance because of its medicinal properties. It is obtain in Myanmar, Nepal, Pakistan, Thailand Indonesia, Kenya, Mozambique, China, India, in India it is found in Madhya Pradesh, South, and Indian Ocean [2],

The botanical name of khadira is *Acacia catechu.* Khadira has various synonyms in ancient scriptures of Ayurveda, like balapatra tini leaved; vakrakanta has hooked spines, dantadhavana useful for cleansing the teeth, kanthi beneficial for the kusthaghna, throat, anti dermatosis, etc.[3] In sanskrit Khadira means that which alleviates stabilizes the body and the diseases. The great Susruta has described the plant to be effective as an anti-obesity herb.[4] *Acacia catechu Willd.* (Family: Fabaceae and subfamily: Mimosoideae.) is widely used in Ayurveda for mainly for skin diseases. Khadira water (karingali water) is used as a drinking water in kerla [5]. There are a number of ayurvedic oil perparation which contain Khadira as one of the active ingredients . *Acacia catechu* is highly valuable for its powerful antioxidant and astringent activities. It is also known as Katha which is a dispensable ingredient of Pan betal leaf preparation chewed in India and pakistan. [6] It is useful in oral, throat infections and dental.[7] It is used in the treatment of passive diarrhea either alone or in combination with cinnamon or opium. The bark of *Acacia catechu* in combination with other drugs is prescribed for snake bite.[8] It *Acacia catechu* exhibits various pharmacological effects like anti-inflammatory, anti-diarrhoeal, hypoglycemic, antioxidant, hepatoprotective, antipyretic, and antimicrobial activities.

The chemical constituents of *Acacia catechu Willd* are catechin, epicatechin gallate, epigallocatechin gallete rocatechin, protocatechuic acid, epicatechin,epigallocatechin, quercetin, poriferasterol glucosides, poriferasterol acyglucosides, phloroglucin lupeol, procyanidin AC, kaempferol, dihydrokaemferol, , lupenone, (+)-afzelchin gum, taxifolin, and mineral. *Acacia catechu* is also useful as a topical agent for sore gums and mouth ulcers. [9].

This agent has been commonly used in India as an ointment for indolent ulcers and has been used in rural Bangladesh as a component of an anti-fertility pill. Other uses include arresting nose bleeds, assisting healing in nipple fissures, and acting as a contraceptive.

Corresponding Author **Rakesh Tiwle Email:-** rakesh_tiwle@rediffmail.com

General Description [10]

The plant is called *khair* in Hindi, and *kachu* in Malay as the type-species from which the extracts cutch and catechu are derived it is also known as *senegalia catechu* is a deciduous, thorny tree which grows up to 15 m (50 ft) in height. Common names for it include, cutchtree, black cutch, catechu, cachou and black catechu. *It* is found in China, Asia, India.

USES

Food

It is an extract of its heartwood,[11] is used as an ingredient to give red color and typical flavor to paan. Paan, from the word in Hindi is an Indian and Southeast Asian tradition of chewing betel leaf (*Piper betle*) with areca nut and slaked lime paste.

Wood

The tree is often planted for use as firewood and charcoal and its wood is highly valued for furniture and tools. The wood has a density of about 0.88 g/cm^3.

Miscellanous uses

Its heartwood extract is used in as a preservative for fishing nets, dyeing and leather tanning, and as a viscosity regulator for oil drilling.[12]

Medicinal uses

A wood extract called catechu is used in traditional medicine for sore throats and diarrhea. [13] The concentrated aqueous extract, known as khayer gum or cutch, is astringent. It is used in Ayurvedic medicine.

PHYTOCHEMICALS

Heartwood [16]

Flavanoids: Epigallocatechin, epicatechin gallate, Catechin, (-) epicatechin, epigallocatechin gallate, rocatechin, phloroglucinol, procatechuic acid, catecutannic acid, quercetin.

Leaves

Alkaloids: Kaempferol, dihydrokaempferol, taxifolin, (+)-afzelchin gum.

Bark

Glycosides: Poriferasterol, poriferasterol acylglucosides , Tannins: Gallic acid, d-rhamnose, Sugars: D-galactose, and l-arabinose, phlobatannins.

Fruit

Fruit a strap-shaped pod, 5-8.5 cm x 1-1.5 cm, flat, tapering at both ends, shiny, brown, dehiscent, 3-10 seeded; seeds broadly.[17]

Powder

Catechu is used for diarrhea, swelling of the nose and throat, dysentery, swelling of the colon (colitis), bleeding, indigestion, osteoarthritis, and cancer.[18] People apply catechu powder directly to the hemorrhoids and skin diseases and traumatic injuries; to stop bleeding; and for dressing wound.[19] It is included in mouthwashes and gargles used for gum disease (gingivitis), pain and swelling inside the mouth (stomatitis), [20] It is thought that catechu may contain chemicals that can decrease inflammation and kill bacteria.

MEDICINAL USED OF *ACACIA CATECHU*

ANTIBACTERIAL ACTIVITY

Taxifolin present in heartwood found in Acacia catechu which is responsible for Anti-bacterial effect.[22] A study conducted in ethanolic and aqueous heartwood extract of *Acacia catechu*, proved its efficacy as a potent anti-bacterial agent.

Anti-oxidant activity

Antioxidant activity were analysed by Dot-blot assay and quantitative analysis by DPPH (1, 1, -diphenyl-2-picryl hydrazyl) radical scavenging assay with ascorbic acid as standard.[23] The results of dot-blot assay showed yellow coloured spots when sprayed with DPPH solution the plant extract which proves to be antioxidant.

Anti-pyretic activity [24]

Anti-pyretic activity were observed in the study Albino rats (150-200 g) after inducing fever by injecting, subcutaneously, 20% suspension of dried yeast in 2% gum acacia in normal saline at a dose of 20 ml/kg of body weight. Animals in the various steps were treated as follow.

Steps I: 3% aqueous suspension of *gum acacia* (1 ml/200 g) as vehicle, orally.
Steps II: Aqueous suspension of ethyl acetate extract of *Acacia catechu* 250 mg/kg (1 ml/200 g) with 3% gum acacia as 5% suspension, orally.
Steps III: Aqueous suspension of ethyl acetate extract of *Acacia catechu* 500 mg/kg (1 ml/200 g) with 3% gum acacia as 10% suspension, orally.
Steps IV: Aqueous acetyl salicylic acid, 300 mg/kg (1 ml/200g) with 3% gum acacia as 6% suspension, orally. Rectal temperature was recorded every hour for four hours after administration of drugs.

Anti-mycotic activity

Anti mycotic activity of heartwood of *Acacia catechu* willd on selected fungal species like *Aspergillus fumigates, Aspergillus niger, Candida albicans. Mucor spp* and *Penicilium marneffei*. The results obtained from our study shows that ethanolic extract has got a very good anti mycotic activity against the selected fungal species [25].

Anti-secretory and Anti-ulcer Activity:

Antisecretory and antiulcer activity of *Acacia catechu willd* against indomethacin plus pyloric ligation induced gastric ulcers in rats [26].

The results of the study suggested that *Acacia catechu willd* causes an inhibitory effect on release of gastric hydrochloric acids and protects gastric mucosal damage due to presence of flavanoids and tannins in the plant extract [27].

HYPOGLYCAEMIC ACTIVITY

In eastern traditional medicine *Acacia catechu willd* is extensively used in management of diabetes in combinations with other medicinal plants [28]. Hypoglycemic activity of extract of *Acacia catechu wild* is assumed to be due to the presence of flavonoids which also show inhibition of cyclooxygenase and regenerate β cells. In an experiment, ethyl acetate extract of *Acacia catechu Wild* at a concentration of 500mg/kg/day used for 7 days [29].

SORE THROAT

This is very common in Asia especially in central Asian countries like Pakistan and India and most common home remedy used for sore throat. *Acacia catechu willd* is one of most important ingredient used in Paan which is also called as beetle leaf.[30] People of different ages use it for healing of sore throat, because of its astringent and soothing effect. Tannins present in *Acacia catechu willd* are responsible for this property [31].

IMMUNOMODULATORY ACTIVITY

Aqueous extract of *Acacia catechu* after oral administration (5 mg/kg and 50 mg/kg). The effect was studied in neutrophil adhesion test, mice lethality test, carbon clearance assay, cyclophosphamide induced neutropenia, serum immunoglobulin levels and the heamagglutination test [32]. *Acacia catechu* extract showed an increase in the neutrophil adhesion to the nylon fibres, produced a significant increase in the phagocytic index and a significant protection against cyclophosphamide induced neutropenia indicating its effect on cell mediated immunity [33].

WOUND HEALING:

In Asia crushed bark of *Acacia catechu* is used topical on wounds healing medicinal plant [34] It has astringent effect and also cause precipitation of skin which makes it very good wound healing plant.

MISCELLANEOUS USES [35]

Decoction of bark mixed with milk is taken to cure cold and cough. Decoction is taken as tea by the pregnant ladies to keep warm their body. Anti-fertility pill, arresting nose bleeds, chronic gonorrhea, it is also used in skin disorders, itching problems, obesity, blood disorders, asthma, anemia, dental caries, vaginal diseases, leucorrhea, menorrhagia, sexual dysfunction, helminthiasis and in hypertension.

MANUFACTURING PROCESS OF KATHHA

Heart wood of khair or acacia is cut into fine chips and around 8-10 kgs. of chips are kept in wire net cage to avoid direct contact with heated surface of extractor. These cages with about 28-29 ltrs. of water (3 times the weight of chips) are placed in extractors. Extraction is done by boiling chips with water for about 3.5 hours.[36] Extracts from each extractor are mixed after filtering with the help of fine muslin cloth and concentrated in an open pan on fire and then kept in shade to facilitate crystallization of Kattha for about 48 hours. After complete crystallization, the curd like mass is passed through frame and plate-type filter press, operated manually and then it is washed with cold water which improves the quality of kattha [37]. It is then placed on wooden frames provided with canvas cloth to separate traces of cutch. Finally, kattha is cut into uniform tablets with the help of wire cutter or knife and dried in sheds. The mother liquor after removal of kattha is further concentrated in an open pan till it becomes viscous and then poured in wooden frames for drying [38]. The dried material is cutch. About 100 kgs of acacia chips give 5 kgs. of kattha and 14 kgs of cutch. Yield largely depends upon the quality of chips. The process flow chart are as follow.

Table 1: Common Name of *Acacia catechu willd* in Different Language [14]

S/No	Language	Name
1	Gujarati,	Khair, Kathe, Kher
2	. Bengali	Khera, Khayera
3	Hindi	Khair
4	Kannada	Kachinamara, Kaggali,Kaggalinara
5	Kashmiri	Kath
6	Assamese	Kharira, Khara, Khayar
7	Malayalam	Karingali
8	Marathi	Kharira, Khair
9	Oriya	Khaira
10	Punjabi	Khair
11	Tamil	Karungkali, Karungali
12	Telugu	Chandra, Kaviri Urdu Chanbe, Kaath
13	Sanskrit	Khadira, Raktasaar

Table 2: Scientific classification of Acacia catechu willd. [15]

Kingdom	Plantae – Plants
Sub kingdom	Tracheobionta – Vascular plants
Spermatophyta	Seed plants
Division	Magnoliophyta - Flowering plants

Class	Magnoliopsida - Dicotyledons
Subclass	Rosidae
Order	Fabales
Family	Fabaceae - Pea family
Genus	Acacia Mill. – Acacia
Species	*Acacia catechu* Willd. – black cutch

Figure 1. *Acacia catechu willd*, Medicinal plant

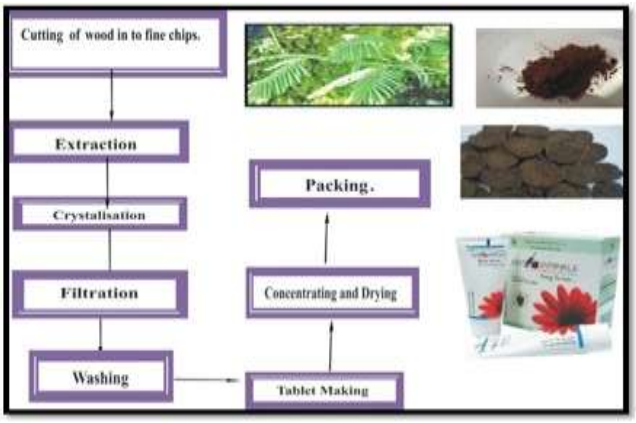
Figure 2. Katha with paan

Figure 3. Catechu trunks

Figure 4. Catechu fruits

Figure 5. Catechu powder

Figure 6. Flow chart of Manufacturing Process of Kathha



ACKNOWLEDGEMENT

The authors would like to acknowledge the assistance provided by kind cooperation of Secretary Shri Keshavrao Mankar Bhavabhuti Shikshan Sanstha "Shri Laxmanrao Mankar Institute of Pharmacy" Amagoan, Gondia Maharashtra, India.

REFERENCES

1. *Acacia nilotica* (acacia). *Plants & Fungi*. Royal Botanic Gardens, Kew. Archived from the original on 12 January 2010. Retrieved, 2010, 01-28.
2. Anders Backlund & Kåre Bremer. To be or not to be – principles of classification and monotypic plant families. *Taxon* 1998, 47(2), 391-400.
3. Perry LM. Medicinal plants of East and South East Asia: attributed properties and uses. *MIT Press*, 1980.
4. Anonymous. The wealth of India. Vol. I, CSIR Publication, New Delhi, India, 1985.

5. Sharma P, Dayal R, Ayyer KS. Chemical constituents of Acacia catechu leaves. *Indian Journal of Chemical Society*, 60, 1999.
6. Sangthong S, Pintathong P, Chaiwut P. Comparison of microwave-assisted methods on extraction of cosmetic bioactivities from *Areca catechu* L. In proceeding of international conference, 2012, 271-274.
7. Sani IM, Iqbal S, Chan KW, Ismail M,Effect of acid and base catalyzed hydrolysis on the yield of phenolics and antioxidant activity of extracts from germinated brown rice (GBR). *Molecules*, 17, 2012, 7584-7594.
8. Thaipong K, Boonprakob U, Crosby K, Zevallos C L, Byrne H B. Comparison of ABTS, DPPH, FRAP and ORAC assays for estimating antioxidant activity from guava fruit extracts. *J Food Compos Anal*, 19, 2006, 669-675.
9. Chino K, Matsuo T, Iwamoto M. New 5-nucleotidase inhibitors, NPF-86IA, NPF-86IB, NPF-86IIA, and NPF-86IIB from *Areca catechu*. II. Anti-tumor effects. *Planta Med*, 54(5), 1988, 419-422.
10. Lee KK, Choi JD. The effects of *Areca catechu* L extract on anti-inflammation and anti- melanogenesis. *Inter J Cosmet Sci*, 21, 1999, 275-284.
11. Bamard DL, Smee DF, Huffman J.H, Meyerson CR and Sidwell RW. Review of Quercetin and related Bioflavonoids. *Chemotherapy*, 39, 1993, 203- 11.
12. Anitha Roy, Geetha R.V, Lakshmi T, In Vitro Evaluation of Anti Mycotic Activity of Heartwood Extract of cacia Catechu Willd. *Journal of Pharmacy Research*, 4(7), 2011,
13. Alali FQ, K Tawaha, T El-Elimat, M Syouf, M El-Fayda, K Abulaila, SJ Nielsen, WD Wheatons, JO Falkinham, NH Oberliesy, *Nat. Prod. Res*, 2(12), 2007, 1121-1131.
14. Singh KN and Lal B. Notes on Traditional Uses of Khair (Acacia catechu Willd.) by Inhabitants of Shivalik Range in Western Himalaya *Ethnobotanical Leaflets*, 10, 2006,109-12.
15. Nadumane KV, Nair S. Evaluation of the anticancer and cytotoxic potentials of *Acacia catechu* extracts in vitro. *J of Nat.Pharmaceuticals*, 2(4), 2011, 190-5
16. Roy A, Geetha RV, Lakshmi T. In vitro Evaluation of Anti mycotic activity of Heartwood Extract of *Acacia catechu Willd*. *J Pharmacy Res*, 4(7), 2011, 2010-11.
17. Gayathri DV, Lanitha J, Devi R, Sreekala, Prabhakaran V.A. Pharmacognostical studies on *Acacia catechu willd* and identification of antioxidant principles. *Int. J. of Pharmacy and Pharmaceutical Sci*, 3(2), 2011, 108-11.
18. Varkung V, Imoba TS, Joychandra SO, Babycha L, Aruna S. Protective Effect of Ethyl Acetate Extract of *Acacia Catechu* in Carbon Tetrachloride Induced Hepatotoxicity. *Indian Medical Gazette*, 2012, 159-162
19. Guleria, S, Tiku, A, Singh, G, Vyas, D, & Bhardwaj A. (2011). Antioxidant Activity and Protective Effect against Plasmid DNA Strand Scission of Leaf, Bark, and Heartwood Extracts from Acacia catechu. *Journal of Food Science*, 76(7), 2011, C959-64.
20. Cyanogenic Glycosides in Ant-Acacias of Mexico and Central America David S. Seigler, John E. Ebinger The *Southwestern Naturalist*, 32, 4(12), 1987, 499-503.
21. Jarald, E, Joshi, SB, & Jain, DC, Biochemical study on the hypoglycaemic effects of extract and fraction of Acacia catechu willd in alloxan-induced diabetic rats. *Ind J Diabetes & Metabolism*, 17, 2009, 63-9.
22. Strobel, P, Allard, C, Perez-Acle, T, Calderon, R, Aldunate, R, & Leighton, F, Myricetin, quercetin and catechin-gallate inhibit glucose uptake in isolated rat adipocytes. *Biochemical Journal*, 386(3), 2005, 471-8.
23. Clement, B.A, Goff, C.M, Forbes, T.D.A. (1998). Toxic Amines and Alkaloids from Acacia rigidula. *Phytochem*, 49(5), 1998, 1377-1380.
24. Alam, G, Singh, M, P, & Singh A. Wound healing potential od some medicinal plants. *Int. J.of Pharmaceutical Sci. and Res*, 9(1), 2011, 136-45.
25. Karwani G, Singhvi I, Gupta S, Kapadiya, N. and Sisodia SS. Antisecretory and antiulcer activity of *Acacia Catechu* against indomethacin plus pyloric ligation Induced gastric ulcers in rats. *J of Cell and Tissue Res*, 11(1), 2011, 2567-71.
26. Varkung V, Imoba TS, Joychandra SO, Babycha L, Aruna S. Protective Effect of Ethyl Acetate Extract of *Acacia Catechu* in Carbon Tetrachloride Induced Hepatotoxicity. *Indian Medical Gazette*, 2012, 159-162.
27. Jayasekhar P, Mohanan PV, Rathinam K. Hepatoprotective activity of ethyl acetate extract of *Acacia catechu. Indian J Pharmacol*, 29, 1997, 426-28
28. Edwin J, Siddheshwar BJ, Dharam JC. Biochemical study on the hypoglycaemic effects of extract and fraction of *Acacia catechu willd* in alloxan-induced diabetic rats. *Int J Diabetes & Metabolism*, 17, 2009, 63-69.
29. Atmani D, Chaher N, Berboucha M, Debbache N, & Boudaoud H. Flavonoids in human health, from structure to biological activity. *Current Nutrition & Food Science*, 5(4), 2009, 225-37
30. Anonymous, Indian Herbal Pharmacopoeia, Revised new edition 2002, *Indian Drug Manufacturers Association*, Mumbai, 2002, 11(1), 13-16.
31. Sham JS, Chiu KW, Pang PK. Hypotensive action of Acacia catechu. *Planta Med*, 50(2), 1984, 177–180.
32. Meehan, Christopher J, Olson, Eric J, Curry, Robert L. Exploitation of the *Pseudomyrmex–Acacia* mutualism by a predominantly vegetarian jumping spider, 2008.
33. Martin Heil, Sabine Greiner, Harald Meimberg, Ralf Krüger, Jean-Louis Noyer, Günther Heubl, K. Eduard Linsenmair & Wilhelm Boland, 2004, 205–208.

34. Altavilla, D, Squadrito, F, Bitto, A, Polito, F, Burnett, B, Di Stefano, V, & L, Minutoli, Flavocoxid, a dual inhibitor of cyclooxygenase and 5-lipoxygenase, blunts pro-inflammatory phenotype activation in endotoxin-stimulated macrophages. *British journal of pharmacology*, 157(8), 2009, 1410-18.
35. Singleton, V.L, Orthofer, R, Lamuela-Raventos, R.M. Analysis of total phenols and other oxidation substrates and antioxidants by means of Folin-Ciocalteu reagent. *Meth. Enzymol*. 299, 1999, 152-178.
36. Lemmens RHMJ, Soerianegara I, Wong WC (eds.). Plant Resources of South-east Asia, 5(2), 1995.
37. Anders Backlund & Kare Bremer (1998). "To be or not to be – principles of classification and monotypic plant families". *Taxon*, 47(2), 1998, 391-400.
38. Pingale SS. Heptoprotection by *Acacia catechu* in CCL4 Induced Liver Dysfunction *Int. J of Pharmaceutical Sciences Rev. and Res*, 5(1), 2010, 150-154.