



Review Article

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A Recent Update on the Pharmacognostical as well as pharmacological Profiles of the *Acacia Catechu* Heartwood: A Mini Review

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ABSTRACT

Acacia Catechu L. (Fabaceae) has been drastically utilized in holistic drug alongside way of the Austronesia for ancient history many thousand years before. The whole plant of the *A. Catechu* is acquired a comprehensive variety of medicinal potential such as antioxidant, anti-inflammatory, antibacterial, antifungal, astringent, anthelmintics, analgesic, anti-diabetic, wound healing, anti- tumors, immune booster, etc. Chemical examination of this widely growing plant is manifested that it accommodates very high amounts of the tannin, flavonoids, and phenolic compounds, especially catechin/ epicatechin, epigallocatechin, quercetin, taxifolin & procyanidin, etc. The presence of these active compounds is to be shown the drug is to possess an excellent antioxidant, anti-inflammatory, astringent & anti-diabetic outcome. The heartwood of this plant is to give a medicinally potent product is known as Katha having a wide range of therapeutic potential. The prime phytoconstituents of the heartwood are catechin or epicatechin/ catechin exists in this plant performs an important function such as antioxidant, anti-inflammatory, antimicrobial & anticancer potential. Due to the wide range of the medicinal activity of the *A. Catechu* heartwood, it may have a wide area of research. This review only focuses only on the recent update on the Pharmacognostical as well as pharmacological Profiles of the *A. Catechu* Heartwood.

Keywords: *Acacia Catechu*, Polyphenolics, Antioxidant, Catechin, Heartwood.

INTRODUCTION

Acacia Catechu is to be one of the widely growing plants found at an altitude of 1200m in the forest area including the sub-Himalayan tract in India as well as in Pakistan, Nepal, Bhutan, Thailand, and China ^[1]. *A. Catechu* L. (Fabaceae), marketed appearance is frequently termed as a Katha is obtained from the heartwood *A. Catechu* by extraction 10% of hydro-alcoholic solution ^[2]. It has been drastically utilized in holistic drug alongside way of the Austronesia for ancient history many thousand years before Ayurveda and Unani system of medicine ^[3]. The whole plant of the *A. Catechu* is acquired a comprehensive variety of medicinal potential such as antioxidant, anti-inflammatory, antibacterial, antifungal, astringent, anthelmintics, analgesic, anti-diabetic, wound healing, anti- tumors, immune booster, etc. ^[4] Chemical examination of this widely growing plant is manifested that it accommodates very high amounts of the tannin, flavonoids, and phenolic compounds, especially catechin/ epicatechin, epigallocatechin, quercetin, taxifolin & procyanidin, etc. ^[5]. The presence of these active compounds is to be shown the drug is to possess an excellent antioxidant, anti-inflammatory, astringent & anti-diabetic outcome ^[6]. The heartwood of this plant is to give a medicinally potent product is known as Katha having a wide range of therapeutic potential. The prime phytoconstituents of the heartwood are catechin or epicatechin/catechin exists in this plant performs an important function such as antioxidant, anti-inflammatory, antimicrobial & anticancer potential ^[7]. In vivo Catechins are considerably and hastily metabolized and impart to their antioxidant property ^[8]. They routinely constitute polyphenols & flavonoids, which appear terrible absorption because of concerning inherent numerous benzene ring shapes, improper for passive drug carriers or lack of carrier-mediated drug transport system, or bad partition coefficient value ^[9]. This review article is to be based upon the inspection of the pharmacognosy as well as the pharmacological action of the heartwood of the *A. Catechu* inside the body.

MORPHOLOGY FEATURE OF *A. CATECHU* WILLD

A. Catechu plant has common peak varies from 5-15 meter tall ^[10]. The Stem of *A. Catechu* is Straight and grayish brown ^[11]. The bark of *A. Catechu* is darkish brown, exfoliating in slender strips of brown & red inside ^[12]. Leaves of the acacia plant are bipinnate having 10-30 pairs of pinnae exclusive among 20-50 pairs of leaflets ^[13]. The spines are short and hooked shaped & Inflorescence Auxiliary pedunculate spike.

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The flower is scented Flowers, Creamy whitish. The Pods are flat brown and 5-15 seeded as shown in Figure 1. The wooden of *A. Catechu* is

split into three elements specifically bark, sapwood & heartwood as shown in Figures 1 & 2 [14].



Figure 1 & 2: Demonstrated the plant khadira & wood of *A. Catechu*

PHYSICO-CHEMICAL & FLUORESCENCE ANALYSIS OF HEARTWOOD OF *A. CATECHU*

The physiochemical characteristics of the *A. Catechu* are to be shown various results as per Ayurvedic Pharmacopoeias of India [15]. The physicochemical & varied privileged parameters are stated in Table 1. Fluorescence behavior concerning botanical drug *A. Catechu* heartwood below ordinary light or UV light (UV 366 nm) is to be resolute [16]. The powder of catechu heartwood sample and with different chemical the visibility of changeable colours that are mentioned in the tabulated form in Table 2.

Table 1: Shows the Physio-chemical parameters of the heartwood of *A. Catechu*

S. No.	Test	Results % (range)
1.	Loss on drying at 105°C	8.20 - 11.70 percent
2.	Total ash	1.23 - 2.11 percent
3.	Acid insoluble ash	0.16 - 0.4.20 percent
4.	Water-soluble ash	0.08 - 0.33 percent
5.	Water-soluble extractives	22.30 - 24.70 percent
6.	Alcohol soluble extractives	18.30 - 20.30 percent
7.	the pH of water extract	5.95 - 6.05
8.	Volatile oil	None
9.	Content of fiber	47.00 - 55.00 percent
10.	Index of swelling	4.00 - 5.00 ml/gm
11.	Index of foaming	<100
12.	Total sugar amount	1.15 - 1.85 percent
13.	Reducing sugar amount	0.66 - 1.40 percent

Table 2: Fluorescence behavior of heartwood of *A. Catechu*

Treatment	Visible light	Short wave (254 nm)	Longwave (365 nm)
Distilled water	Light brown	Yellow	Dark green
Methanol	Brown	Orange	Green
Hexane	Transparent	Violet	Dark violet
6 N HCl	Colorless	Dark violet	Colorless
NaOH	Brown	Dark brown	Greenish brown

CHEMICAL CONSTITUENTS OF *A. CATECHU* HEARTWOOD

The heartwood, bark, leaves, flower, and root of the origin of the diverse active constituents make this plant a medicinally beneficial herbal drug. Mostly in the investigation and potential point of view, the heartwood of *A. Catechu* having a crucial role, so for medicinal benefit heartwood is to be utilized. Major chemical components of the heartwood of *A. Catechu* Willd are catechin, (-) epicatechin, epigallocatechin, epicatechin gallate, epigallocatechin gallate, rocatechin, phloroglucin, protocatechuic acid, quercetin, poriferasterol glucosides, poriferasterol, acylglucosides, lupenone, lupeol, procyanidin AC, kaempferol, dihydrokaempferol, L-arabinose, D-galactose, D-rhamnose andaldobiuronic acid, afzelchin gum, and mineral [17]. The medicinal value of *A. Catechu* is being the antioxidant potential of these ingredients. Besides the antioxidant potential, it is to possess drug is a rich source of tannin content in them as possess the very good astringent action ion the human body so it has excellent potential to cure wound in the human body [18].

PHYTO-CHEMICAL ANALYSIS OF *A. CATECHU* HEARTWOOD

Preliminary phytochemical screening of the Heartwood extracts of *A. Catechu* was as in line with standard process & shows the presence of functional moiety shown below in table no.3 and 4 [19].

Table 3: Phyto-chemical analysis of heartwood of *A. Catechu*

Materials	Reagent	Functional group	Observation	Inference
Alcoholic extract of heartwood <i>A. Catechu</i> powder	Dragendroff's test	Alkaloids	Orange-brown ppt.	Present
	Lead acetate	Flavanoids	Yellow ppt.	Present
	Dil. FeCl ₃	Tannins	Blue color	Present
	Shaking in test-tube	Saponins	Frothing with a honeycomb appearance	Present
	Molish's test	Carbohydrate	Violet ring	Present
	Biuret reagent	Proteins	Violet color	Present
	Iodine solution n	Starch	Blue color	Absence
	Salkowski test	Steroids	Red color	Absence

PHYTO-CONSTITUENTS AND PHARMACOLOGICAL ACTIVITY OF VARYING FRAGMENTS OF *A. CATECHU* WILLD

Table 4: Phyto-constituents and pharmacological potential of drugs [20]

Scientific title	Common name	Family	Part utilized	Active constituents	Pharmacological activity
A. Catechu	Katha Khadira Karungali Black cutch	Fabaceae -pea family Subfamily: Mimosaceae	Heartwood	Phenolics, Tannin & Flavonoids as a potent compound is as follow: a) Catechin b) (-) Epicatechin, c) Epigallocatechin, d) Epicatechin gallate, e) Epigallocatechin gallate, f) Rocatechin, g) Phloroglucinol, h) Procatechuic acid, i) Catecutannic acid, j) Quercetin, k) Quercitrin.	Antibacterial & Anti-mycotic action. To cure the sore mouth, Gingivitis, Dental carries, it posses Anti-oxidant, Anti-inflammatory, chemoprotective, & Antidiarrhoeal action. ETA extract of <i>A. Catechu</i> occupies Analgesic, antipyretic, Hepatoprotective & Anti-diabetic potential.

PHARMACOLOGICAL POTENTIAL OF *A. CATECHU* HEARTWOOD

Antibacterial potential

Antimicrobial potential of pet - ether, ETA, ETO proportion Water (one proportion one) extracts appropriate to the heartwood of *A. Catechu* has been assessed versus some pathogenic fungus & gram (+) type and gram (-) type bacteria. It must be described that the ETO & ETA turned into located to possess the broadest and effective antimicrobial potential although pet- ether & ET extract have mild antimicrobial activity [21].

Anti-mycotic potential

An investigation demonstrates that the anti-mycotic pursuit of the heartwood of *A. Catechu* wild on exclusive fungal for example candida Albicans, aspergillus niger, aspergillus fumigates, mucor spp. & penicilium marneffi. Disc diffusion approaches were appropriate for conceal anti-fungal pursuit. Outcomes consequence from this examination suggests a particular ETO extract has given excellent antimycotic potentials towards the selected fungal species. This

suggests that *A. Catechu*-specific extract must be demonstrating the excellent growth retarding potential towards the numerous species of the fungi [22].

Antioxidant potential

Catechins & epicatechins are present within the *A. Catechu* need to possess a strong antioxidant pastime [23]. It is carried out a radical scavenging experimental inspection on hydro extracts of *A. Catechu* & *R. Aquatica*. From individual experimental inspection, he found out particular poly-phenolic compounds existing within the polar extracts occupy a more potent antioxidant interest that can be convenient in the treatment of tumors & most tumor sufferers go through radiation cure [24].

Immunomodulatory potential

A. Catechu extract composed a tremendous growth inner the serum immunoglobulin levels, enhance within the haem-agglutination titer values. This can lessen the transience proportion in mice, recommended owned impact on the immune system. In consequently, it could be achieved a certain hydro-extract of *A. Catechu* possess a remarkable impact adjacent two types of cellular & humoral immunity, so it is achieved that *A. Catechu* is to act as a good immune-modulatory agent [25].

Antipyretic potential

This study has to bring an inquiry to demonstrate the influence of *A. Catechu* in yeast prompted pyretic rats examined the rats of one hundred fifty to two hundred gram weight. Later on, activating fever through utilizing injection, SC routes, twenty percent suspension of dried yeast in two percent gum Acacia in normal saline at a dose of twenty ml/kg. The ETA extract of *A. Catechu* & aspirin remarkably reduced the temp of increased temp animal especially, rats at 2nd, third & 4th hrs succeeding drug or extract analysis. This test has to be demonstrating that the *A. Catechu* ethyl acetate extract has been acting as a very good antipyretic agent towards the fever [26].

Hepatoprotective potential

Execute a demonstration to investigate the hepatoprotective effects & feasible mechanism of *A. Catechu* in acetaminophen (APAP) precipitated hepatotoxicity utilizing female Wistar rat version. From the consequences of the parameters done, it's far clear that *Acacia Catechu* gave excellent quality healing for hepato-protection. From his experiment on the Wistar, rat version has been verified that the *A. Catechu* has incredible hepatoprotective potential. In another scientific work additionally inspected the hepato-protective option of *A. Catechu* extract on CCl₄ precipitated liver destruction inside the rats [27].

Anti-diarrhoeal potential

A scientific study on to assess the anti-microbial potential of duramen extract of *A. catechu* on the decided study on enteric pathogens. Anti-microbial potential of ETO & hydro-extract of duramen of *A. Catechu* become concealed in opposition to *S Typhi*, [Gram (-) bacilli], *S flexneri* [Gram (-) bacilli], *E.Coli* [Gram (-) bacilli], *K pneumonia* [Gram (-) bacilli], *V cholera* [Gram (-) bacilli], *P aeruginosa* [Gram (-) bacilli] & *S aureus*, [Gram (+) cocci], the utilization of plate of agar diffusion

approach. Consequences of scientific inspection confirmed this all two extracts at unique concentrations revealed antimicrobial potential in opposition to the inspected bacterial. Consequently, *A. Catechu* duramen extract is likewise demonstrated action as a powerful botanical drug deal with diarrhea resulting from enteric pathogens [28].

Anti-diabetic potential

In this examination extracts of *A. Catechu* willd (Leguminosae) ETO extract had been inspected for its anti-hyperglycemic potential in glucose full hyperglycemic rats. The effective ETO extract *A. Catechu* had been exposed to an anti-diabetic pursuit in alloxan-brought about diabetic rats at dose extend, two hundred & four hundred mg/kg, reciprocally. Various variables testing in rats body, consisting of glucose, urea, creatinine, serum cholesterol, serum triglyceride, HDL & LDL, hemoglobin & glycosylated hemoglobin has been eliminated. These ETO extract of *A. Catechu* manifested giant anti-hyperglycemic potential & yield dose-structured hypo-glycemia in fasted ordinary rats. Hence, *A. Catechu* is demonstrated to possess a large Antihyperglycemic potential [29].

Anti-secretary and antiulcer potential

An experimental trial executed on anti-secretary & antiulcer potential of *A. Catechu* across indomethacin + pyloric ligation prompted stomachic ulceration in study animals. The consequences of this investigation have recommended that *A. Catechu* reasons an inhibitory impact on secreted stomachic HCl & shields stomachic mucosal destruction [30].

Anti-cancer potential

A. Catechu ethanol seed extract therapy brought concerning the cytotoxicity in SCC-25 cells including IC₅₀ value of concentration 100µg/ml. Apoptotic detector caspases 8 & 9, cytochrome C, Bax gene expressions were substantially enhanced consequently to ACS extract therapy suggest the apoptosis inaugural in SCC-25 cells. This ETO seed extracts of *A. Catechu* were resolute to be cytotoxic through the lessen concentration & carry on apoptosis in human oral squamous carcinoma SCC-25 cells [31].

Anthelmintic potential

The *A. Catechu* ethyl acetate fragment of alcoholic extracts revealed efficacious anthelmintics pharmacology. It can be correlated to alcoholic extract as indicated by utilizing a large decrease in time of paralysis & death. The resolute activity perhaps being the existence of phenolic compounds, primary flavonoids in the examined extract e.g. ethyl acetate fragment of alcoholic extracts. This in vitro research suggested this *A. Catechu* willd is a big source of natural anthelmintics, and that its efficacy beneficial in preventing the progress of diverse parasitic disarray [32].

CONCLUSION

A. Catechu heartwood has been in use since ancient times to treat a wide range of diseases in traditional system medicine. Experimental studies have proven its antidiabetic, antihypertensive, antibacterial,

antifungal activity, antiplaque, antioxidant, antiviral activity, anti-inflammatory activity, anticancer activity & wound healing potential. Scientific studies have proven the claims of the traditional system of medicine. Furthermore detailed clinical researches are needed to explore its medicinal value to establish it as a standard drug.

Conflict of Interest

None declared.

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REFERENCES

1. Mohammad Rashid, et al. Kath (*Acacia Catechu*): An Overarching Envelop of Traditional and Modern Update. Int. J. Currnt. Tren. Pharm, Res., 2015, 3(5):1007-12.
2. Sharma P. Investigation on Photodecomposition of Standardised Ethyl Acetate Fraction of Katha. Pharmacogn J. 2020; 12(4):815-20.
3. Hashmat, MA, & Hussain, R., A review on *Acacia Catechu* Willd. *Interdisciplinary Journal of Contemporary Research in Business*, 2013; 5(1):593-600.
4. Aggarwal et al., Identification of novel anti-inflammatory agents from Ayurvedic medicine for prevention of chronic diseases: "Reverse pharmacology" and "bedside to bench" approach. *Current drug targets*, 2011; 12(11):1595-53.
5. Lin HY, Chang TC, & Chang ST, A review of antioxidant and pharmacological properties of phenolic compounds in *Acacia confusa*. *Journal of Traditional and Complementary Medicine*. (2018).
6. Saha et al., Effect of *Acacia Catechu* (L.f.) Willd. on Oxidative Stress with Possible Implications in Alleviating Selected Cognitive Disorders. *PLOS ONE*, 2016; 11(3):e0150574.
7. Sharma, P. "investigation on pharmacognosy of katha powder as well as it's in vitro cytotoxic activity". *Asian Journal of Pharmaceutical and Clinical Research*, 2021; 14(1):133-40,
8. Jayakumar T, Saravana Bhavan, P, & Sheu, JR. Molecular Targets of Natural Products for Chondroprotection in Destructive Joint Diseases. *International Journal of Molecular Sciences*, 2020; 21(14):4931.
9. Stevanovic T, Diouf, PN, & Garcia-Perez ME., Bioactive polyphenols from healthy diets and forest biomass. *Current Nutrition & Food Science*, 2009; 5(4):264-95.
10. Qadry JS, Shah's and Qadry's. Pharmacognosy, 12th edition, B.S Shah Prakashan, Ahmedabad, 2008; 302-03.
11. Wallis TE, Textbook of Pharmacognosy, 5th Edition, CBS Publishers and Distributors, New Delhi, 2005; 461-63.
12. Devi et al., Pharmacognostical studies on *Acacia Catechu* willd and identification of Antioxidant principles int j pharm, 2011; 108-11.
13. Dhruve K, Harisha CR, Prajapati PK., Pharmacognostical evaluation of *Acacia Catechu* willd. heartwood with special reference to tyloses. Int J Green Pharm, 2011; 5:336-41.
14. Bhattarai R, Sharma P, Wagle B, Adhikari A, & Acharya S. Revision and Compilation of Health Management Plan of Khair (*Acacia Catechu*). *Grassroots Journal of Natural Resources*, 2020; 3(1):15-28.
15. Jaiswal Y, Liang Z, & Zhao Z. Botanical drugs in Ayurveda and traditional Chinese medicine. *Journal of ethnopharmacology*, 2016; 194: 245-259.
16. Raj RN, & Radhamany PM., Pharmacognostic and physicochemical analysis on the leaves of *Brunfelsia americana* L. *Asian Pacific Journal of Tropical Biomedicine*, 2012; 2(1):S305-S307.
17. Meera B, Chander J, Kalidhar SB. A Review on the chemistry and bioactivity of *Acacia* Spp. *Journal of Medicinal and Aromatic Plants Science*. 2005; 27:51-90.
18. Haslam E., Natural polyphenols (vegetable tannins) as drugs: possible modes of action. *Journal of natural products*, 1996; 59(2):205-215.

19. Modi *et al.*, Extracts from *Acacia Catechu* suppress HIV-1 replication by inhibiting the activities of the viral protease and Tat. *Virology journal*, 2013; 10(1):1-17.
20. Thakur AV, Ambwani S, & Ambwani, TK., Preliminary phytochemical screening and GC-MS analysis of leaf extract of *Acacia Catechu* (Lf) Willd. *International Journal of Herbal Medicine*, 2018; 6(2):81-85.
21. Silva E, Fernandes S, Bacelar E, & Sampaio A., Antimicrobial activity of aqueous, ethanolic and methanolic leaf extracts from acacia spp. And eucalyptus nicholii. *African journal of traditional, complementary and alternative medicines*, 2016; 13(6):130-34.
22. Negi BS, & Dave BP., In Vitro Antimicrobial Activity of *Acacia Catechu* and Its Phytochemical Analysis. *Indian Journal of Microbiology*, 2010; 50(4):369-74.
23. Stohs, S. J., & Bagchi, D. Antioxidant, Anti-inflammatory, and Chemoprotective Properties of *Acaciacatechu* Heartwood Extracts. *Phytotherapy Research*, 2015; 29(6):818-24.
24. Ismail S, Asad M., Immunomodulatory activity of *Acacia Catechu*. *Indian J Physiol Pharmacol*. 2009; 53(1):25-33.
25. Namsa, N., Mandal, M., Kalita, P., Das, A., Mandal, S., & Tag, H. Antipyretic and antibacterial activity of *Chloranthus erectus* (Buch.-Ham.) Verdcourt leaf extract: A popular folk medicine of Arunachal Pradesh. *Indian Journal of Pharmacology*, 2010; 42(5):273.
26. Chandrasekaran C, Dethe S, Mundkinajeddu D, Pandre M, Balachandran J, Agarwal A, & Hiraganahalli D. Hepatoprotective and antioxidant activity of standardized herbal extracts. *Pharmacognosy Magazine*, 2012; 8(30):116.
27. Saini ML, Saini R, Roy S, & Kumar A., Comparative pharmacognostical and antimicrobial studies of *Acacia* species (Mimosaceae). *Journal of Medicinal Plants Research*, 2008; 2(12):378-86.
28. Joshi S, Subedi YP, Paudel SK., Antibacterial and Antifungal Activity of Heartwood of *Acacia Catechu* of Nepal. *J. Nepal Chem. Soc.*, 2011; (27):2011.
29. Patel D, Kumar R, Laloo D, Hemalatha S., Natural medicines from plant source used for therapy of diabetes mellitus: An overview of its pharmacological aspects. *Asian Pac J Tropic Dis.*, 2012; 2(3):239-250.
30. Bhatnagar M, & Sisodia SS., Antisecretory and antiulcer activity of *Asparagus racemosus* Willd. against indomethacin plus pyloric ligation-induced gastric ulcer in rats. *Journal of herbal pharmacotherapy*, 2006; 6(1):13-20.
31. Lakshmi T, Ezhilarasan D, Vijayaragavan R, Bullar SK, Rajendran R., *Acacia Catechu* ethanolic bark extract induces apoptosis in human oral squamous carcinoma cells. *J Adv Pharm Technol Res*, 2017; 8:143-9.
32. Patil SH, Deshmukh PV, Sreenivas SA, Sangameshwar K, Vijapur LS. In vitro anthelmintic activity of *Acacia Catechu* Willd. *Int J Green Pharm*, 2013; (7):34-6.

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