



***Cedrus deodara* (Roxb. ex D. Don) G. Don “Wood of The Gods”: An inclusive study**

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ABSTRACT

The medicinal tree Cedrus deodara, which is a member of the family Pinaceae, is used in the treatment of many conditions like infection of skin, infections of microbes, disorders of joints and also kidney stones and other immune system and brain diseases. It has long been significant and prominent in the old-style medical methods of India, parlyts of China, Korea, and other nations. This analysis provides an indication of the information that is currently available regarding the biological activity, pharmacological profile, and traditional uses of Cedrus deodara crude extract, as well as details on its isolated compounds and oil that can be obtained from Cedrus deodara, in order to assess the potential for the development of novel therapeutic agents. All the data including various data basis has been castoff to compile all pertinent data from this species' previous published literature. Along with other official internet resources, the Northern Regional Center, A variety of notable pharmacological and biological undertakings, including anti cancerous activity, antibacterial, analgesic, protcetcing neuro activity, antiurolithiatic, antiarthritic, and antiasthmatic properties, were discovered in preliminary pharmacological studies of Basic extracts, essential oils, fractions, and isolated compounds from Cedrus deodara. As a result, additional research is essential to determine its mode of accomplishment, effectiveness, dose range, and safety when treating various unreasonable disorders.

Keywords- *Cedrus deodara, Toxicity, antiurolithiatic, isolated compounds, crude extract.*

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INTRODUCTION

Christoph Jakob Trew published the first description of the genus Cedrus (Pinaceae family) in 1757[1]. It has a widespread range 107 trinomials and 4 species are found in the Western Himalayan and Mediterranean Sea regions[2]. Deodar cedrus (Roxb. ex D. Don) the Atlantic cedar (Endl.) North Africa's Morocco and Algeria are home to the *Cedrus brevifolia* species of Manetti ex Carriere (Hook. f.) Henry and Cedrus libani A. Rich are discovered in Cyprus. Which can be tracked down in Syria, Lebanon, Turkey, and Lebanon? In the Indian Himalayas, the Hindu Kush, and the Karakoram, G. Don is available [3]. Deodar cedrus (Roxb. ex D. Don) Himalayan cedar, deodar, and devdaru, bhadradaru, and amaradaru are some of the common names for G. Don in English, Hindi, and Sanskrit, respectively[4]. The tree is referred as "Bhadra" in Hindu Vedic writing [5]. Since the beginning of time, deodar has been revered as the place where gods live due to its pungent smell, inspiring height, and high character[6]. The scent, inspiring height, and majestic nature of deodar have led many to believe that Gods live there since ancient times[7]. It is widespread in the Western Himalayan regions, which are located between 1200 and 3000 metres above sea level in North Central parts of India, Northern part of Pakistan, and South Western parts of Tibet, require acidic, well-drained soil to thrive[8]. A well-known ornamental tree with a nice scent, C. deodara is typically grown in regions with winter lows of 10 C [9]. The tree is huge in light of its ethno medical applications; for example, Gum and oil of C. Deodara have been utilized to fix fever, restlessness, dyspepsia, hiccoughs, and irritation[10]. Necessary oils from C. deodara have been utilised as insecticides and to cure animal ailments and its wood has been used as a diuretic, gas expelling property. Involving in vivo preclinical models. Moreover, a few pharmacological properties of C. deodara have been tentatively tried in vitro, including antidiabetic, against proliferative, and hostile to type 1. Herpes simplex virus properties. [11]. Researchers are consistently working to investigate the active ingredients and related pharmacological activity of C. deodara in light of its ethnomedicinal usage and therapeutic qualities. Despite the fact that several authors have occasionally published evaluations of C. deodara, these

publications don't go into considerable detail regarding the tree[9,10,11].The purpose of this article was to order and fundamentally review all of the data that are currently available on Cedrus, with an prominence on pharmacokinetics, and pharmacology concentrates have dynamic substances, as well as the gaps in momentum exploration and perspectives for the future.Researchers will undoubtedly benefit from the current review in understanding the limitations of the most recent scientific literature and recognise A prospective therapeutic candidate for the management of several illnesses is C. deodara.

TAXONOMICAL/BOTANICAL DESCRIPTION

An individual from the Pinaceae family and the variety Cedrus, C. deodara is an evergreen tree. Around 225 types of trees in 11 genera having a place with the Pinaceae family are native toward the northern halves of the globe. Deodara, C. (Roxb. ex D. Wear) Ex-D. Wear and *Abies deodara*, G. Wear is otherwise called *Pinus deodara* Roxb. (Roxb. ex D. Don) [12].It is a immense immortal tree with horizontal branches and long, spiky-like leaves that is 65 metres tall [13].The reddish-brown cedar bark has vertical and horizontal fractures. The shrub is monoecious, but in the fall, the male and female blooms grow on separate branches. Cedar cones can be rectangular, spherical, or bell-shaped, all of which are smaller than an inch[14]. The taste of its wood is unpleasant. Fig. 1 shows images of C. deodara and its various components. Deodar's outstanding insecticidal powers, which prevent huge conifer aphids from stunting plant growth, are one of its many commendable qualities [15]. Other Cedrus species (*C. atlantica*, *C. bravifolia*, and *C. libani*) are dissimilar from Deodar in terms of morphology, geographic distribution, altitudinal range, and ecology. It can reach heights of between 15 and 50 meters, and is easily recognised.[16].



FIG. 1: Cedrus deodara tree, bark, cones, and heartwood.

TRADITIONAL USES AND ETHNOPHARMACOLOGY

The medical benefits of *C. deodara* were first recorded in the Ayurvedic texts Sushruta Samhita and Charaka Samhita both were written around 1000 B.C. [17]. The native people of various Indian areas and other countries refer to C. deodara by a variety of vernacular names, some of which are included in Table 1. It is known as devdaru in Ayurveda.

Table 1- Showing common name, country and references

SERIALNO	COMMON NAME	COUNTRY	REFERENCES
1.	Diwar/Devdar	Uttrarakhand/ India	[45]
2.	India/Diyar Jammu & Kashmir	Diyar Jammu and Kashmir/India	[40]
3.	Devdaar, Vanseodeodar Gujarat/India	Devdaar, Vanseodeodar Gujarat/India	[46]
4.	Indian state of Maharashtra:Devadaru	Indian state of Maharashtra: Devadaru	[54]
5.	Deodar Pakistan	Deodar Pakistan	[66]
6.	Tibet Thang-shing	Thang-shing Tibet	[33]
7.	Xue song, Xiangbai China	China Xiangbai, Xue song	[40]
8.	Devadaru, Suradaru Nepal	Dyar, Debdar, Devadaru, Suradaru Nepal	[12]

C. deodara has been categorised under many medication categories basically in systems like ayurveda system of medicine. It falls under the Anuvasanopagagana category in the Charaka Samhita (drugs used in oil enema)[18].& Stanyashodhana drug groups (drugs used to detoxify and purify breast milk)[19]. It falls under the Sushruta Samhita category of Eladi[20]. (drugs that counteract the effects of poison)[21]. The Charak Samhita makes reference to the utilization of *C. deodara* wood powder during rub treatment called Udvaartana [22]. Both the Samhita ,Charak emphasise the plant's potential for healing arthritis and reactions. Additionally, an Ayurvedic paediatric textbook's Prakara Yoga chapter mentions the plant's immunomodulatory properties (Arogya kalpadruma)[23]. For such treatment of colds, coughs, malignancies, leukoderma, inflammation, diarrhoea, and Tuberculosis. In general deodar timber fat and bay residue is rummage-sale to treat blood disorders, piles, itching, dyspepsia, bronchitis, skin ailments, and urine discharges[24].The tree is significant in terms of ethnomedicine due to the usage of its wood to treat inflammation[25]. Both its oil and gum of *C.deodara* have been used to treat hiccoughs and uncomfot in sleep[26].The Ayurveda chapter "Jvaracikitsa" also discusses the use of *C. deodara* for fever cure[27]. The natural treatment Kwath, which is made by bubbling *C. deodara* wood chips, has been utilized for various years.

In Ayurveda to treat respiratory catarrh and increment resistance. Besides, *C. deodara* has been utilized in Customary Chinese Medication to treat various illnesses[28]. To increase energy, people use its needles as dietary supplements. These people drink tea made of *C. deodara* needles to receive its medicinal and nutritional benefits[29].East Asian manufacturers of functional beverages, dietary supplements, sausages and wines frequently use *C. deodara* needles as the primary ingredient. Some of these products include powder, tea, and wine. [30].The Word reference of Chinese Rough Drugs specifies *C. deodara*'s helpful advantages as diminishing tingling, wiping out parasites, disposing of wind, and dispensing with dampness. Also, local people in India's Naran Valley and KuzAbakhel (Smack region) use *C. deodara* wood oil to treat myiasis and other skin conditions, while their root extricate is utilized to mend mouth ulcers and inner injuries[31,32]. Numerous ethnoveterinary activities have revealed *C. deodara*'s potential as an ethnomedicine. in addition to human use. To alleviate gastrointestinal issues and stop milk from smelling unpleasant, Bajaur district residents in Pakistan add 5-10 drops of *Cedrus deodara* fat mixed with H2O and is given orally to the cattles [33,34].It's been reported that smoke from burning *C. deodara* bark in the Almora district of Uttarakhand/India as a snake repellent to protect cattle, and how an extraction made from *C. bark* is mixed with animal feed and used to treat snake bites by the researchers[35]. In the parts of Nigeria, bark decoction is also used to treat other conditions include cattle with diarrhea, external ulcers, and skin symptoms.

Aside from that, people in the Doda region of Jammu and Kashmir, ancestral gatherings in the Focal Himalayas and furthermore in uttrakhand apply to treat pleuritis and other skin issues in sheep, goats, cows, and bison, topically apply *C. deodara* wood oil once everyday[35,36]. (Saganuwan2010) has reported the usage of smoke from In Nigeria, a decoction produced from *C. deodara* bark is mixed with animal feed and used as a snake bite antidote, in contrast to burning *C. deodara* bark (Almora district, Uttarakhand/India) to protect the cattle In Nigeria, a bark decoction is also used to treat external ulcers, skin symptoms, and livestock [35,37].In addition, people in the Central Himalayas and district of J&K also do the application *Cedrus deodara*. Wood oil topically B.D to delight skin illnesses On sheep, goats, cows, and buffaloes [38,39]. In Uttarakhand, India, natives and tribal people utilize *C. deodara* to treat scabies, parasites and harmed horns in dairy cattle. The Bhotiyas, Rhajis, Tharus, Jaunsaris, and Box as are a portion of these gatherings [40].The currently available publications highlight the significance of *C. deodara* in both human and animal ethnomedicine. The following list includes *C. deodara*'s ethnomedical uses[40,41].The Bhotiyas of certain Himalayan states in India, *C. deodara* has been widely utilized, especially in Uttarakhand, to treat urticaria, scabies, dermatitis, tingling, disease and skin ulcers, among other known ethnomedicinal uses. [42,43, 44].It is likewise obvious that the bay, wood, and branch of *C. deodara* are the portions that are used most commonly to treat skin disorders. Some Ayurvedic formulations with *C. deodara* in them, such as Divya Khadirarisht, Khadirarishta Asava Arisht, Divya Kayakalp Taila, and Divya Kayakalp Kwath have been marketed for treating skin conditions. Surprisingly, however, no scientific research on the plant has been done in relation to this particular market segment.

Table 2 shows many pharmacological studies on *C. deodara*, conducted in vitro and in vivo.

S.N	Pharmacological activity	Segments that are used	Procedure of preparation	Amount /duration /frequency	Region	References
1.	Skin conditions Nettle rash	Bark and wood Bark oil, Stem Resin Bark	Extract Extract Extract Decoction	2-4 of <i>C.deodra</i> drops are usually taken with milk and that should be taken before breakfast and has to be Administered orally.	Uttarakhand/India (Garhwal)	[8]
	Scabies (skin disease)	Wood of <i>C.deodra</i>	oil	Small amounts i.e few drops are applied externally.	Parts of western Nepal and Darchula (uttrakhand)	[99]
	Dermatitis	Root, Stem Oil of bark.	Oil extract	<i>Rubus paniculatus</i> Sm. leaf powder is combined with 5 drops of oil and is pertain externally for about 3 days.	Central parts of Himalayas/India	
	Burns	Pine needle	Extract	-	J&K(INDIA)	
2.	Disorders of joints					
	Arthritis	Oil extracted from wood.	Extract	Little amount of oil is used on the part which is been affected B.D	Uttarakhand/India(Nanda Devi National Park)	[48]
	Joint pain	Oil extracted from wood	Extract	Oil is taken in less amount and is applied externally in the joints.	Kalimath valley Uttarakhand/India	[87]
3.	GIT disorders					
	Ulcers of GIT	Wood	oil	Little extent oil pragmatic superficially on belly part twice a day	Mukteswar (Uttarakhand/India)	[49]
	Worms in stomach	Oil of bark		½ Spoon is given orally one time a day.	Niti Valley(India)	
	Bowel dysfunction	Bay of <i>C. deodar</i>	Extracted decoction	Extracted decoction is specified orally.	Uttarakhand/India (Kedarnath)	
4.	Microbial infections					[50]
	Bacterial infections	Heart	Powder of the extract.	For the treatment of puerperal infection, take 4g of wooded powder ia taken with water through oral route.		"The Ayurvedic Pharmacopoeia of
	Fungs related illnesses.	Spikes	Boiled extract	-	Moscow	[55]
	Wound injury	Leaf and resin		-	Uttarakhand/India (Rawain valley) Rudrprayag	[11]

The Gujjars and Bakarwals of Jammu and Kashmir, are concentrating on *C. deodara* for the treatment of other illnesses such joint issues[45,46,47], gastrointestinal disorder[48], microbial infections[49,50], wound injury[51,52,53], urine complaints[54,55,56]. Traditional *C. deodara* parts include the stem. Needle [57,58]. wood oil [59]. resin [60,61,62]. bark [60]. leaves[61,62]. have been reported for its antibacterial efficacy, although scientific research has only shown that *C. deodara* needles have some antimicrobial potential[63,64]. Although *C. deodara* has been utilised as an immunomodulatory agent in Ayurveda, there is no proof to back up this assertion. East Asian nations frequently employ *C. deodara* needles as nutritional supplements to boost immunity, particularly in China and Korea[65]. One of the ingredients used in UITs and to improve infertility is *C. Deodara* in An Phalakalyan Ghrita, an ayurvedic polyherbal composition. Additionally, the medical system of Ayurveda Hemorrhagic ovarian cysts and menstrual irregularities has been successfully treated in the past with the plant and its oral formulations. [66]. Moreover, V-gel, an antiseptic formulation used to treat vaginal infections, is made with a major component of *C. deodara*[67].

BIOLOGICAL ACTIVITIES

A wide range of human and cattle ailments have been treated with Extracts and preparations of *Cedrus deodara* can be used in a wide variety of human and animal feed. Due to popularity as an ethnomedicinal treatment. It has been confirmed in vivo and in vitro that this plant has a wide range of traditional uses. Table 2 shows many pharmacological studies on *C. deodara*, conducted in vitro and in vivo.

ANTIMICROBIAL ACTIVITY

It has long been known that several *C. deodara* sections have antibacterial properties[68,69]. To clarify their antibacterial activity, *C. deodara* needles have been the subject of some in vitro research. In a study, the antibacterial activity of an extract of *C. deodara* needles are useful against a number of Infections caused by foodborne microorganisms and parasites was tested using the well known Oxford plate method. The *C. Deodara* needle extract's high antibacterial efficacy ranged from 0.2 to 50 mg/ml, according to the study. It was discovered that Gram (+ve) and Among the many bacterial strains that were examined, Gram (-ve) bacterial and fungal strains were less responsive to treatment with pine needles than other bacterial and fungal strains..The similar study was conducted [69]to determine how effective the pine needle water extract is against a variety of bacteria found in food. Additionally, NMR, MS, and HPLC analyses demonstrated that shikimic was the primary constituent of the aqueous extract of needles[70].

ANTI-FUNGAL ACTIVITY

As per therapeutic research, *C. Deodar* [71], *deodara* has apparently been used from very ancient time in the treating variety of range of infections of the skin and fungi in China, India, and Russia. The compounds' antifungal activity was evaluated using the broth microdilution method (2S, 3S,6R) and -atlantone-2 was found in chips of wood from *Cedrus deodara*. In contrast, *T. rubrum* was inhibited at 125 g/m by 3-diols. However, to test these compounds against additional fungal strains, a range of dosages should be used. This goes with the anti-bacterial activity of atlantone, additional research is required to identify molecular targets in fungi [72,73]. In order to research the antifungal properties of *Deodara* root oil and its remaining parts.

ANTI-CANCER ACTIVITY

The Ayurveda medical system states that *C. deodara* has traditionally been used to cure a number of illnesses, [74].Which includes colon malignant growth, liver disease, ovarian disease, and others [75,76].. The creators found that prison cell outlines detached from the colon, cervix, prostate, liver, neuroblastoma, and bosom tissues were stifled at measurements of 10, 30, and 100 g/ml. Lignan was viewed as the most effective substance in correlation investigations of the inhibitory focus (IC50) upsides of four unmistakable mixtures, including bezybutyrolactol, matairesinol, wikstromol, and lignan combination [77,78]. Combining lignans shown anticancer synergistic effects[79].Study results were positive. [80].when directed intravenously to mice at dimensions of 300 mg per kg also 400 mg/kg for 9 days[81].

ANALGESIC AND ANTI-INFLAMMATORY ACTIVITY

Scientific research does not provide strong support for the outdated use of *Cedrus deodara* as a painkilling and against inflammatory medication[82,83]. A study examined the painkilling and anti-inflammatory properties of an crucial oil extracted from *C. deodara* wood using various animal models. [84].After five days of oral administration of 50 mg/kg and 100 mg/kg oil, mice were grouped according to body weight showed improved response times as well as a huge, focus subordinate reduction in acidic corrosive prompted squirming. [85]. At the same dose, essential oil also successfully prevented the development of polyarthritis .In the model of paw edema caused by carrageenan, it is accepted that mixtures with mitigating properties hinder cyclooxygenase, forestalling the creation of prostaglandins[86]. This shows that the cox enzyme, which is convoluted in the generation of PG, may be blocked by *Cedrus* wood oil, which demonstrates action of anti-inflammatory properties in cancer-induced inflammation in swine. Evidence for the anti-inflammatory qualities of oil was also supplied by the adjuvant's capacity to prevent the acute stage of arthritis[87]. This proposes that *Cedrus deodara* oil has anti-inflammatory activities through lowering prostaglandin synthesis and increasing lysosomal membrane stabilising activity. Paw edema was avoided in a nystatin-induced inflammatory paradigm. The skill of *Cedrus deodara* wood oil to stabilise membranes is established by looking at how it affected the erythrocyte membrane. *Cedrus deodara* suppressed erythrocytic lysis caused by heat and hypotonic solution[88].

NEUROPROTECTIVE ACTIVITY

Heartwood from *C. deodara* is traditionally used to balance an unstable state of mind and to relieve tension, anxiety and rage[88]. (Northern Regional Center, Botanical Survey of India) headache and migraine Numerous studies have been done to determine how *C. deodara* heartwood contributes to neuroprotection.. Alcoholic heartwood extract was tested in a study for its ability to calm mice's anxiety and prevent seizures[89]. The results of this investigation demonstrated the strong Heartwood extract

has the ability to reduce anxiety by reducing mice aversion fear in a manner that is concentration-dependent the same dosage for the heartwood extract as well. Significantly, mice managed heartwood extricate for seven days likewise showed a significant ascent in GABA Compared to the benchmark group, there were increases in the cerebellum. This study suggests that a change in GABA in the brain may be the cause for the anticonvulsant properties of *C. deodara* heartwood. The precise association between the changes that take place between the diseased and treatment periods is nevertheless constrained by the absence of a positive (illnessed) control group in this investigation. Another study looked at how volatile oil from *C. deodara* heartwood and a chloroform extract could enhance elderly people's memory[90]. Over a seven-day training period, it was possible to significantly reduce the mice's escape latency in both the working and orientation memory gatherings. On the 8th day of the test preliminary, rats given oral portions of 50mg/kg and 100 mg/kg of chloroform extricate displayed longer target area exploration times. Research on antioxidants have also revealed that in the mouse frontal brain and hippocampus, endogenous antioxidant markers are increased and dangerous reactive compounds are considerably inhibited by chloroform extract [91].

ANTI DIABETIC ACTIVITY

The Ayurveda medical system has made reference to the antidiabetic properties of *C. deodara* [92]. Research has documented the *C. deodara*'s demonstrated capacity to lower blood sugar levels. An analysis of the antidiabetic effects of an ethanolic extract of *C. deodara* timber on rats subjected to alloxan-induced hyperglycemia was done [93].The investigation discovered that treatment of hyperglycemic rodents for 14 days with an ethanolic concentrate of At doses of 50 and 100 mg/kg, p.o., *Cedrus deodara* wood significantly reduced glucose levels. Essentially, a decent antidiabetic potential was displayed in an ethanolic remove ready from *C. deodara* stem wood [94].These investigations, however, are insufficient to prove that *C. deodara* has an anti-diabetic effect. Additional biochemical, histological, and To verify the benefits of *C. deodara* for diabetes prevention, mechanistic investigations should be carried out and other related illnesses [94]. Similar research was done to find out how *C. deodara* stem bark extract affected rats with hyperglycemia brought on by streptozotocin. Rats fed oral stem bark extract for 21 days on the specific Blood glucose levels were substantially lowered by dosages of 250 and 100 mg/kgs well as an increase in body weight that was close to normal levels. Also, rats given *C. deodara* stem bark extract had their high levels of streptozotocin related biological markers like brought down to normal levels for triglycerides, SGOT, SGPT, and cholesterol. By enhancing pancreatic islet renewal and restoring islet normal cell size through histological analysis of pancreatic tissue, the extract was found to have protective effects. According to this investigation, the ethanolic extract of stem bark produces hypoglycemic effects. But, it will soon be required to separate the primary element from the relevant extract and investigate how it functions. to ascertain how the stem bark of *C. deodara* protects against diabetes.

TOXICITY

The extracts of crude, separated fractions, and chemicals obtained from *C. deodara* have been the subject of several pharmacological research, some of which have revealed potential toxicity. There is no discussion of toxicity in ethnobotanical studies of plant uses. It was smooth safe for rodents to take oil which contains neem, which had a LD50 worth of 500 gm/kg, as per a concentrate on the security oil from the root of *C. deodara*. When given orally to pale skinned person mice for seven days, it was seen that the ethanolic concentrate of *C. deodara* stem bark was protected up to 1600 mg/kg and granted no indications of harmfulness. Up to degrees of 2000 mg/kg, a watery concentrate of *C. deodara* heartwood managed orally to pale skinned person mice made no pessimistic impacts [95].Furthermore, extracts from ethanol and acetone albino mice exposed to up to 300 mg/kg of *C. deodara* wood was seen to be harmless, while greater dosages displayed toxic effects[96]. Moreover, Perveen et al. (2013) documented some negative effects of *Cedrus deodara* root oil at doses of 0.5 ml/kg and 2.5 ml/kg on the gastrointestinal tissues of Wistar rats, including epithelial degradation, blood vessel congestion, and edema on mucosal and sub-mucosal layers. To determine the plant's overall safety and toxicity, as well as its isolation components, the results of the exploratory stage of toxicological [97].

IMPENDING PERSPECTIVE

C. deodara has been used for centuries in a variety of Ayurvedic preparations, including pills and powders, to cure a wide range of diseases. Although extensive traditional research on the plant, the majority of the ailments it has been used to cure have only lately obtained scientific support [98].Preliminary pharmacological studies on various *C. deodara* extracts partially shown their efficacy in treating conditions like cancer, neurological disorders, arthritis, inflammation. Hemachalol, cedrin, and atlantone in particular are regularly detected in various plant portions of *C. deodara* and are perceived as the key parts liable for an assortment of recorded organic activities. Consequently, comprehensive investigation is necessary to ascertain their therapeutic functions, the precise mechanism of action, and

their effectiveness in a range of clinical scenarios [98]. Very few toxicological characteristics from *C. deodara*'s toxicological tests were shown in the published reports; as a result, the results are insufficient to confirm the plant's overall safety and toxicity, as well as that of its isolated components. So, in order to establish its safety profile in clinical subjects and determine its therapeutic index, this plant demands thorough and organ-specific toxicity investigations [99].

CONCLUSION

The current paper offers information on the ethnopharmacology, Traditional use and biological activity of *C. deodara* as well as the particular limitations on the ongoing investigation. Indigenous people from 28 distinct ethnic groups, including those from India, Pakistan, Nepal, Korea have employed *C. deodara* to treat almost forty sicknesses. The bark, wood, and stem of the plant have for some time remained the subject of escalated study for the treatment of skin issues in the two people and creatures. Regardless of the fact that *C. deodara* is commercially accessible in many different Ayurvedic formulations for the treatment of skin disorders, scientific research on *C. deodara* about its utility in treating skin issues is surprisingly limited sparse. Similar research is being done on the use of *C. deodara* needles as an Immunomodulatory in East Asia and China. To carefully isolate active components from other plant portions, careful efforts should be made. Although several phytoconstituents from *C. deodara* have been found, it is unknown how much of these chemicals originate from particular plant parts.

REFERENCES

1. Farjon, A., (1990). Pinaceae: Drawings and Descriptions of the Genera *Abies*, *Cedrus*, *Pseudolarix*, *Keteleeria*, *Nothotsuga*, *Tsuga*, *Cathaya*, *Pseudotsuga*, *Larix* and *Picea*. Koeltz Scientific Books, West Germany 330.
2. Trew, C.J., (1957). The History of the Cedars of Lebanon with *Illoleerici*. Fir-Pinique comparatus, Nurnberg.
3. Qiao, C.Y., Ran, J.H., Li, Y., Wang, X.Q., (2007). Phylogeny and biogeography of *Cedrus* (Pinaceae) inferred from sequences of seven paternal chloroplast and maternal mitochondrial DNA regions. *Ann. Bot.* 100 (3), 573–580
4. Sharma, P., Samant, S.S., (2014). Diversity, distribution and indigenous uses of medicinal plants of Parbati Valley of Kullu district in Himalyan
5. Singh, P., Tripathi, K., Yadav, R.B., Yadav, K.N., (2014). Devadaru (*Cedrus deodara* (Roxb.) Loud.): a critical review on the medicinal plant. *Int. J. Ayurveda Pharma Res.* 2 (1), 1–10. Sinha, D., 2019. A review on phytochemical,
6. Singh, P., Khosa, R.L., Mishra, G., (2013). Evaluation of antidiabetic activity of ethanolic extract of *Cedrus deodara* stem bark in streptozotocin induced diabetes in mice. *Niger. J. Exp. Clin. Biosc.* 1, 33–38.
7. Farjon, A., 1990. Pinaceae: Drawings and Descriptions of the Genera *Abies*, *Cedrus*, *Pseudolarix*, *Keteleeria*, *Nothotsuga*, *Tsuga*, *Cathaya*, *Pseudotsuga*, *Larix* and *Picea*. Koeltz Scientific Books, West Germany 330.
8. Nandakumar, K., Radhakrishnan, R., Rangappa, S., Rajesh, D., Muruganathan, G., Talwar, S., 2010. Anti-urolithiatic activity of heartwood extract of *Cedrus deodara* in rats. *J. Compl. Integr. Med.* 7, 1–9.
9. Odum, S., 1985. Report on Frost Damage to Trees in Denmark after the Severe 1981/82 and 1984/85 Winters. Hørsholm Arboretum, Denmark.
10. Khare, C.P., 2007. Indian Medicinal Plants, first ed. Springer-Verlag, New York, pp. 133–134.
11. Loizzo, M.R., Saab, A., Tundis, R., Statti, G.A., Lampronti, I., Menichini, F., Gambari, A., Cinatl, J., Doerr, H.W., 2008. Phytochemical analysis and in vitro antiviral activities of essential oils of seven Lebanon species. *Chem. Biodiversity.* 5, 461–470.
12. The Plant List, 2013. <http://www.theplantlist.org/tpl/record/kew-2707322>. 15 June 2021.
13. Chaudhary, A.K., Ahmad, S., Mazumder, A., 2013. Cognitive enhancement in aged mice after chronic administration of *Cedrus deodara* Loud. and *Pinus roxburghii* Sarg. with demonstrated antioxidant properties. *J. Nat. Med.* 68, 274–283.
14. Shah, R., (2006). Nature's medicinal plant of Uttaranchal, Nainital. *Gyanodaya Prakhasan* 1, 15–16.
15. Myers, V.R., (2019). Deodar Cedar Plant Profile. The Spruce, Newyork.
16. Pijut, P.M., (2000). *Cedrus*- the true cedars. *Arboric. J.* 26 (4), 218–224.
17. Singh, D., Raguraman, S., (1997). Bio-potentials of *Azadirachta indica* and *Cedrus deodara* oils on *Callosobruchus chinensis*. *Int. J. Pharmacogn.* 35, 344–348.
18. Aggarwal, K., Bishnoi, A., 2019. A conceptual study on imperative herbs from classical texts of Ayurveda used in Panchakarma. *J. Pharmacogn. Phytochem.* 8 (3), 4844–4848.
19. Kale, P.D., Dei, L.P., Donga, S.B., Thakar, A., Shukla, V.J., (2016). Pharmacognostical and physicochemical evaluation of Stanya Shodhganachurna- an ayurvedic formulation in the management of PCOS. *Int. J. Ayurveda Pharm. Chem.* 5 (2), 1–14.
20. Kanaujia, S., Shamsa, F., (2015). Standardization of an ayurvedic herbal eye drops for allergic conjunctivitis. *Int. J. Adv. Res.* 3, 494–499
21. Bishagratna, K.K.L., (1907). *Sushruta Samhita*, Sutrasthana, Chapter XXXVIII-Groups of Drugs, vol. 1. Wisdom Library, Karnataka, p. 60
22. Devi, R., Rashmi, R., (2019). Clinical study to evaluate the efficacy of vachaharidradhigana as udvartana in shoulyawsr to obesity. *Int. J. Curr. Res.* 11 (9), 6961–6964.

23. Raj, A., Uppinakudru, S., Rao, P.N., Ajayan, S., (2014). Review on the concept of immunomodulation in Ayurveda with special emphasis on Prakara Yoga. *Int. J. Pharma Sci. Res.* 5, 1116–1123.
24. Trease and Evans, (1999). *Pharmacognosy*, fourteenth ed. Harcourt brace and company, pp. 471–479.
25. Khare, C.P., (2007). *Indian Medicinal Plants*, first ed. Springer-Verlag, New York, pp. 133–134.
26. Kirtikar, K.R., Basu, B.D., (1933). *Indian Medicinal Plants*. Lalit Mohan Basu, Allahabad, India, pp. 2390–2392.
27. Bhisagratna, K.K.L., (1907). *Sushruta Samhita, Sutrasthana*, Chapter XXXVIII-Groups of Drugs, vol. 1. Wisdom Library, Karnataka, p. 60.
28. Zhang, J.M., Shi, X.F., Fan, B., (2009). Chemical composition of pharmacological activities of *Cedrus deodara*. *Chin. Trad. Patent Med.* 31, 928–933.
29. Ka, M.H., Choi, E.H., Chun, H.S., Lee, K.G., (2005). Antioxidative activity of volatile extracts isolated from *Angelica tenuissima* roots, peppermint leaves, pine needles, and sweet flag leaves. *J. Agric. Food Chem.* 53, 4124–4129
30. Zhang, Z., Lyu, X., Xu, Q., Li, C., Lu, M., Gong, T., Tang, B., Wang, L., Zeng, W., Li, Y., (2020). Utilization of the extract of *Cedrus deodara* (Roxb. ex D. Don) G. Don against the biofilm formation and the expression of virulence genes of cariogenic bacterium *Streptococcus mutans*. *J. Ethnopharmacol.* 257, 1–11
31. Muhammad, N., Uddin, N., Khan, M.K., Umer, M., Ali, N., Ullah, S., (2020). Traditional and cultural uses of medicinal plant species in the fora of KuzAbakhel, for the treatment of various ailments. *Adv. Tradit. Med.* 1, 23.
32. Khan, S.M., Page, S., Ahmad, H., Shaheen, H., Ullah, Z., Ahmad, M., Harper, D.M., (2013). Medicinal flora and ethnoecological knowledge in the Naran valley, Western Himalaya, Pakistan. *J. Ethnobiol. Ethnomed.* 9, 4.
33. Aziz, M.A., Khan, A.H., Adnan, M., Ullah, H., (2018). Traditional uses of medicinal plants used by indigenous communities for veterinary practices at Bajaur agency, Pakistan. *J. Ethnobiol. Ethnomed.* 14 (11), 1–18.
34. Mehra, A., Bajpai, O., Joshi, H., (2014). Diversity, utilization and sacred values of ethno-medicinal plants of Kumaun Himalaya. *Trop. Plant Res.* 1, 80–86.
35. Saganuwan, S.A., (2010). A photo album of some medicinal plants of the Nigerian middle belt. *J. Herbs, Spices, Med. Plants* 16 (3), 219–292
36. Negi, V.S., Maikhuri, R.K., Vashishtha, D.P., (2011a). Traditional healthcare practices among the villages of Rawain valley, Uttarkashi, Uttarakhand, India. *Indian J. Tradit. Know.* 10, 533–537.
37. Sofowora, A., (1993). *Medicinal Plants and Traditional Medicine in Africa*. John Willey and Sons, New York.
38. Khateeb, A.M., Khandi, S.A., Kumar, P., Bhadwal, M.S., Jeelani, R., (2015). Ethno-veterinary practices used for the treatment of animal diseases in Doda district, Jammu and Kashmir. *Indian J. Tradit. Knowl.* 14 (2), 306–312
39. Sofowora, A., (1993). *Medicinal Plants and Traditional Medicine in Africa*. John Willey and Sons, New York.
40. Pande, P.C., Tiwari, L., Pande, C., (2007). Ethnoveterinary plants of Uttaranchal review. *Indian J. Tradit. Know.* 6, 444–458.
41. Dar, A.R., Dar, G.H., (2006). The wealth of Kashmir Himalaya – gymnosperms. *Asian J. Plant Sci.* 5, 251–259
42. Negi, C.S., Nautiyal, S., Dasila, L., Rao, K.S., Maikhuri, R.K., (2002). Ethnobotanical plant uses in small tribal community in a part of Central Himalaya. *Indian J. Hum. Ecol.* 14, 23–31. 43
43. Negi, V.S., Maikhuri, R.K., Vashishtha, D.P., (2011a). Traditional healthcare practices among the villages of Rawain valley, Uttarkashi, Uttarakhand, India. *Indian J. Tradit. Know.* 10, 533–537.
44. Negi, V.S., Maikhuri, R.K., Phondani, P.C., Rawat, L.S., (2011b). An inventory of indigenous knowledge and cultivation practices of medicinal plants in Govind Pashu Vihar Wildlife Sanctuary, Central Himalaya, India. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* 6 (3–4), 96–105.
45. Rana, M.S., Samant, S.S., (2011). Diversity, Indigenous uses and conservation status of medicinal plants in Manali wildlife sanctuary, North Western Himalaya. *Indian J. Tradit. Know.* 10, 439–459.
46. Rao, G.S., Dev, S., Guha, P.C., (1952). Sesquiterpenes. XII. Sesquiterpenes of the essential oil from the wood of the Himalayan *deodara*. *J. Indian Chem. Soc.* 29, 721–730.
47. Rathore, R.S., Goyal, H.R., (1973). Studies on the anti-inflammatory and antiarthritic activity of an Indian medicinal plants, *Cedrus deodara*. *Indian J. Pharm.* 5, 334–343.
48. Rana, C.S., Sharma, A., Kumar, N., Dangwal, L.R., Tiwari, J.K., (2010). Ethnopharmacology of some important medicinal plants of Nanda Devi national park (NDNP) Uttarakhand, India. *Nat. Sci.* 8, 9–14.
49. Rana, D., Bhatt, A., Lal, B., Prakash, O., Kumar, A., Uniyal, S.K., (2020). Use of medicinal plants for treating different ailments by the indigenous people of Churah subdivision of district Chamba, Himanchal Pradesh, India. *Environ. Dev. Sustain.* 23.
50. Rana, M.S., Samant, S.S., (2011). Diversity, Indigenous uses and conservation status of medicinal plants in Manali wildlife sanctuary, North Western Himalaya. *Indian J. Tradit. Know.* 10, 439–459.
51. Negi, C.S., Nautiyal, S., Dasila, L., Rao, K.S., Maikhuri, R.K., (2002). Ethnobotanical plant uses in small tribal community in a part of Central Himalaya. *Indian J. Hum. Ecol.* 14, 23–31.
52. Negi, V.S., Maikhuri, R.K., Vashishtha, D.P., (2011a). Traditional healthcare practices among the villages of Rawain valley, Uttarkashi, Uttarakhand, India. *Indian J. Tradit. Know.* 10, 533–537.
53. Negi, V.S., Maikhuri, R.K., Phondani, P.C., Rawat, L.S., (2011b). An inventory of indigenous knowledge and cultivation practices of medicinal plants in Govind Pashu Vihar Wildlife Sanctuary, Central Himalaya, India. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* 6 (3–4), 96–105.
54. Singh, K.J., Thakur, A.K., (2014). Medicinal plants of the Shimla hills, Himachal Pradesh: a survey. *Int. J. Herb. Med.* 2, 118–127.
55. Singh, K.N., (2012). Traditional knowledge on ethnobotanical uses of plant biodiversity: a detailed study from the Indian Western Himalayas. *Biodivers. Res. Conserv.* 28, 63–77.

56. Singh, K.S., Shanmugavel, M., Kampasi, H., Singh, R., Mondhe, D.M., Rao, J.M., Adwankar, M.K., Saxena, A.K., Qazi, G.N., (2007). Chemically standardized isolates from *Cedrus deodara* stem wood having anticancer activity. *Planta Med.* 73, 519–526.
57. Samant, S.S., Pant, S., Singh, M., Lal, M., Singh, A., Sharma, A., (2007). Medicinal plants in Himachal Pradesh, North western Himalaya, India. *Int. J. Biodivers. Sci. Ecosyst. Serv. Manag.* 3, 234–251.
58. Clark, S.P., Bollag, W.B., Westlund, K.N., (2014). Pine oil effects on chemical and thermal injury in mice and cultured mouse dorsal root ganglion neurons. *Phytother Res.* 28, 252–260.
59. Man, R., Samant, S.S., (2011). Diversity, indigenous uses and conservation status of medicinal plants in manali wildlife sanctuary, North western Himalaya. *Indian J. Tradit. Knowl.* 10 (3), 439–459
60. Rana, C.S., Sharma, A., Kumar, N., Dangwal, L.R., Tiwari, J.K., (2010). Ethnopharmacology of some important medicinal plants of Nanda Devi national park (NDNP) Uttarakhand, India. *Nat. Sci.* 8, 9–14.
61. Rana, D., Bhatt, A., Lal, B., Prakash, O., Kumar, A., Uniyal, S.K., (2020). Use of medicinal plants for treating different ailments by the indigenous people of Churah subdivision of district Chamba, Himanchal Pradesh, India. *Environ. Dev. Sustain.* 23
62. Rana, M.S., Samant, S.S., (2011). Diversity, Indigenous uses and conservation status of medicinal plants in Manali wildlife sanctuary, North Western Himalaya. *Indian J. Tradit. Know.* 10, 439–459.
63. Zhang, Z., Lyu, X., Xu, Q., Li, C., Lu, M., Gong, T., Tang, B., Wang, L., Zeng, W., Li, Y., (2020). Utilization of the extract of *Cedrus deodara* (Roxb. ex D. Don) G. Don against the biofilm formation and the expression of virulence genes of cariogenic bacterium *Streptococcus mutans*. *J. Ethnopharmacol.* 257, 1–11.
64. Zhao, Z., Dong, Z., Ming, J., Liu, Y., (2017). Cedrin identified from *Cedrus deodara* (Roxb.) G. Don protects PC12 cells against neurotoxicity induced by a β 1-42. *Nat. Prod. Res.* 32, 1455–1458.
65. Raj, A., Uppinakudru, S., Rao, P.N., Ajayan, S., (2014). Review on the concept of immunomodulation in Ayurveda with special emphasis on Prakara Yoga. *Int. J. Pharma Sci. Res.* 5, 1116–1123.
66. Panda, A.K., Das, D., Hazra, J., (2014). Ayurvedic regimen in Hemorrhagic ovarian cyst without peritoneal bleeding: a case report. *J. Homeopathy Ayurvedic Med.* 3, 1–3.
67. Pandey, S., (2000). Efficacy of V-gel in vaginitis and cervicitis. *Antiseptic* 5, 155.
68. Zeng, W.C., Jia, L.R., Zhang, Y., Cen, J.Q., Chen, X., Gao, H., Feng, S., Huang, Y.N., (2011). Anti-browning and anti-microbial activities of water-soluble extract from pine.
69. Clark, S.P., Bollag, W.B., Westlund, K.N., (2014). Pine oil effects on chemical and thermal injury in mice and cultured mouse dorsal root ganglion neurons. *Phytother Res.* 28, 252–260.
70. Bai, J., Wu, Y., Liu, X., Zhong, K., Huang, Y., Gao, H., (2015). Antibacterial activity of shikimic acid from pine needles of *Cedrus deodara* against *Staphylococcus aureus* through damage to cell membrane. *Int. J. Mol. Sci.* 16, 27145–27155.
71. Chowdhry L, Khan ZK, Kulshrestha DK. (1997). Comparative in vitro and in vivo evaluation of himachalol in murine invasive aspergillosis. *Indian journal of experimental Biology.* 35(7):727-34.
72. Perveen R, Azmil MA, Naqvi SN, Mahmood SM, Ajmal K, Usman M. (2013). Assessment of *Cedrus deodara* root oil on the histopathological changes in the gastrointestinal tissues in rats. *Pakistan Journal of Pharmaceutical Sciences.* 26(3).
73. Gupta S, Walia A, Malan R. (2011). Phytochemistry and pharmacology of *Cedrusdeodera*: an overview. *International Journal of Pharmaceutical sciences and research.* 2(8):2010.
74. Shinde UA, Phadke AS, Nair AM, Mungantiwar AA, Dikshit VJ, Saraf MN. (1999). Membrane stabilizing activity—a possible mechanism of action for the anti-inflammatory activity of *Cedrus deodara* wood oil. *Fitoterapia.* 70(3):251-7.
75. Phadke K. (1988). In vivo and in vitro models for arthritis. *Indian drugs.* 25(9):354-65.
76. Shinde, U.A., Kulkarni, K.R., Phadke, A.S., Nair, A.M., Mungantiwar, A.A., Dikshit, V.J., Saral, M.N., (1999a). Mast cell stabilizing and lipoxygenase inhibitory activity of *Cedrus deodara* (Roxb.) Loud. wood oil. *Indian J. Exp. Biol.* 37, 258–26.
77. Kunwar RM, Uprety Y, Burlakoti C, Chowdhary CL, Bussmann RW. (2009). Indigenous use and ethnopharmacology of medicinal plants in far-west Nepal. *Ethnobotany research and applications*;7:005-28.
78. Viswanatha, G.L., Nandakumar, K., Ramesh, S.H., Rajesh, S., Srinath, R., (2009). Anxiolytic and anticonvulsant activity of alcoholic extract of heartwood of *Cedrus deodara* Roxb in rodents. *Asian J. Pharmaceut. Clin. Res.* 1, 217–239.
79. 79] Chaudhary AK, Ahmad S, Mazumder A.(2014). Cognitive enhancement in aged mice after chronic administration of *Cedrus deodara* Loud. and *Pinus roxburghii* Sarg. with demonstrated antioxidant properties. *Journal of natural medicines.* 68:274-83.
80. Zhao Z, Dong Z, Ming J, Liu Y. (2018). Cedrin identified from *Cedrus deodara* (Roxb.) G. Don protects PC12 cells against neurotoxicity induced by A β 1–42. *Natural product research.* 32(12):1455-8.
81. Sharma R, Prajapati PK. (2016). Antidiabetic leads from ayurvedic medicinal plants. *Int J Adv Complement Tradi Med.* 2:24-41.
82. Devmurari V, Shivanand P, Vaghani S, Jagganath K, Goyani M, Jivani NP.(2010). Antihyperglycemic activity of ethanolic extract of *Cedrus deodara* wood in alloxan induced hyperglycemic rat. *International Journal of Chemical Sciences.*8(1):483-8.
83. Ahmad R, Srivastava SP, Maurya R, Rajendran SM, Arya KR, Srivastava AK. (2008). Mild antihyperglycaemic activity in *Eclipta alba*, *Berberis aristata*, *Betula utilis*, *Cedrus deodara*, *Myristica fragrans* and *Terminalia chebula*. *Indian Journal of Science and Technology.* 1(5):1-6.

84. Singh P, Khosa RL, Mishra G. (2013). Evaluation of antidiabetic activity of ethanolic extract of *Cedrus deodara* (Pinaceae) stem bark in streptozotocin induced diabetes in mice. *Nigerian Journal of Experimental and Clinical Biosciences*. 1;1(1):33.
85. Kumar A, Singh V, Chaudhary AK. (2011). Gastric antisecretory and antiulcer activities of *Cedrus deodara* (Roxb.) Loud. in Wistar rats. *Journal of Ethnopharmacology*. ;134(2):294-7.
86. Patil S, Prakash T, Kotresha D, Rao NR, Pandey N. (2011). Antihyperlipidemic potential of *Cedrus deodara* extracts in monosodium glutamate induced obesity in neonatal rats. *Indian journal of Pharmacology*. 43(6):644.
87. Heinrich M, Appendino G, Efferth T, Fürst R, Izzo AA, Kayser O, Pezzuto JM, Viljoen A. (2020). Best practice in research—overcoming common challenges in phytopharmacological research. *Journal of Ethnopharmacology*. ;246:112230.
88. Kumar A, Singh V, Chaudhary AK. (2011). Gastric antisecretory and antiulcer activities of *Cedrus deodara* (Roxb.) Loud. in Wistar rats. *Journal of ethnopharmacology*. 134(2):2947.
89. Kumar K, Sharma YP, Manhas RK, Bhatia H. (2015). Ethnomedicinal plants of Shankaracharya Hill, Srinagar, J&K, India. *Journal of Ethnopharmacology*. 170:255-74.
90. Tirtha SS. (2007). *The Āyurveda encyclopedia: Natural secrets to healing, prevention & longevity*. Sat Yuga Press..
91. Perveen R, Naqvi SN, Azmi MA, Tariq RM, Ahmed M, Mehmood S. (2008). Determination of mammalian toxicity of *Cedrus deodara* root oil, against albino rats (Wistar strain). *Pakistan Journal of Entomology* 12:90-97.
92. Fröde TS, Medeiros YS. (2008). Animal models to test drugs with potential antidiabetic activity. *Journal of Ethnopharmacology*. ;115(2):173-83.
93. Devmurari V, Shivanand P, Vaghani S, Jagannath K, Goyani M, Jivani NP. (2010). Antihyperglycemic activity of ethanolic extract of *Cedrus deodara* wood in alloxan induced hyperglycemic rat. *International Journal of Chemical Sciences*. 8(1):483-8.
94. Sharma R, Prajapati PK. (2016). Antidiabetic leads from ayurvedic medicinal plants. *Int J Adv Complement Tradi Med*. 2:24-41.
95. A, Ahmad FJ, Pillai KK, Vohora D. (2005). Amiloride protects against pentylentetrazole-induced kindling in mice. *British journal of pharmacology*. 145(7):880.
96. Jain S, Jain A, Malviya N, Kumar D, Jain V, Jain S. (2014). Antidiabetic activity of *Cedrus deodara* aqueous extract and its relationship with its antioxidant properties. *Journal of Pharmaceutical Sciences and Pharmacology*. 1(3):187-94.
97. Jain S, Jain A, Vaidya A, Kumar D, Jain V. (2014). Preliminary phytochemical, pharmacognostical and physico-chemical evaluation of *Cedrus deodara* heartwood. *Journal of Pharmacognosy and Phytochemistry*.3(1):91-5.
98. Heinrich M, Appendino G, Efferth T, Fürst R, Izzo AA, Kayser O, Pezzuto JM, Viljoen A. (2020). Best practice in research—overcoming common challenges in phytopharmacological research. *Journal of Ethnopharmacology*. 10;246: 112230.
99. Hillier J.(1991). *The Hillier manual of trees and shrubs* (6th edn). David and Charles plc: Winchester. .

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