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Cedrus deodara: A Medicinal Herb

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ABSTRACT

Many plants are important to cure various human ailments. India has a rich source of naturally occurring herbal plants which have huge as well as great pharmacological functions. A lot of medicinal plants are used in treating various disorders. Herbal medicines play a vital role in Ayurvedic, Homeozpathic, oriental and Native American Indian medicine. Various pharmaceuticals companies conducting extensive research on plant materials which have high potential value. Cedrus deodara commonly called as cedar is precious plant belonging to family Pinaceae. C. deodara is a medicinal herb with a lot of beneficial as well as pharmacological activities which prove to be a boon in solving various health issues.

Keywords: Traditional medicine, Ayurvedic, Ornamental, Pharmaceutical value, Deodara

INTRODUCTION

Nature acts as one of the outstanding source of herbal medicine. Nature has provided a full as well as a complete package for various remedies to cure all ailments of man and his life. Major portion of our population depends upon these herbal medicines. Either as a part of plant or as entire plant or as a whole growing plant, these herbal medicines are turning to give a lot of important medicinal uses with fewer side effects. Traditional use of these medicinal plant acts as a way to learn more about potential features of herbal medicines. Herbal plants have provided a good source or huge variety of essential components like phenolic compounds, nitrogen compounds, vitamins, terpenoids and some other secondary metabolites, which are rich in antioxidant, anti-inflammatory, antitumor, antibacterial, antiviral and various other activities. Herbal plants have now become the target of chemists, biochemists and pharmacists. The research of these play a vital role for discovering and developing new drugs which are medicinal in nature that hopefully have lesser side effects but show more effectiveness. Medicinal plants also have non-medicinal uses such as flavors, foods and ornamentals species etc, [1,2].

The World Health Organization (WHO) assumed that 4 billion people, 80 percent of population use medicinal drug for various health issues. Many pharmaceutical companies now a days working on these plants which are being collected either from rain forest or from other places rich in medicinal herbs. There are number of plants derived pharmaceuticals medicines which are highly used in modern medicines with their traditional uses. These medicinal plants are timely used by many people for curing various types of ailments [3-6].

There are many different types of systems of medicines in India like Ayurveda, Siddha, Unani and various local health traditions, use various number of plants for the treatment of various diseases of mankind [7-10]. A lot of plants are used in treating various disease conditions they may be in the form of tonics, anti-malarial, antipyretics, aphrodisiacs, expectorants, hepato-protective, anti-rheumatics, diuretics etc. A modern trend has been observed in the research of these medicinal plants. Export import report suggests that the trade of plant and plant derived products in the global market is around US $60 billion. As it is well known that India, with its rich-biodiversity and rich traditional systems provides a strong base for a large number of plants which can be utilized in health care and common health problems of people. In present time allopathic medicines showing lot of side effects which are very severe so it is very important to find out some herbal medicines for treating diseases.

Cedrus deodara is an evergreen tree (conifer) with an height of 85 m, almost rough black, bark and spreading branches, shoots with dimorphic leaves 2-8 cm needle like with sharp pointed, flowers are monoecious, but some branches Bear flowers with one sex. All the parts of the flower are bitter, pungent, in nature. *Cedrus* is a genus of Pinacea with tropical as well as subtropical distribution. The genus is mainly comprised of trees which are cultivated may be for their usefulness for their ornamental purposes. Seeds usually shed in winter season. Deodara trees live up to 600 years. Flowers come in September to October. Drained soil is well for the growth of these trees. High moisture is favorable for the growth of the plant. Cold wind and frosts may cause injury to young treesM [11].

The first half of plant name that is word Deva means divine, deity, Deus and the second part means durum, tree and true. Forest with devadaru trees was the favorite place of ancient sages who were devoted to Hindu god Shiva. So this plant believed to be a sacred tree. In India total deodara forest are 2,03,263 a comprising of 69,872l 20,391,1,13,000 ha in Himachal Pradesh, Uttar Pradesh and Jammu and Kashmir (Figure 1) [12].

Figure 1: *Cedrus deodara*

Taxonomical classification

Taxonomy	
Division	Pinophyta
Kingdom	Plantae
Class	Pinopsida
Order	Pinales
Family	Pinaceae
Genus	*Cedrus* S
Species	*C. deodara*

Synonyms

Synonyms of this plant are *Cedrus deodara* (latin), deodar, Himalaya cedar (english), devdaar, diar, diyar (hindi), devdaru, amara, devahvaya (sanskrit), devdaar (gujrati), deodar (marathi), devadaru, devadaram, devataram (malyalam), bhadradaaru, daevadaaru, gunduguragi (kannad), burada deodar, deodar (urdu), than sin, than-sin (tibetan), devadaram, tevataram, tunumaram (tamil), and devadaru (nepali).

According to Ayurveda plant *Cedrus deodara* is having various essential magical and important features like: Gunna (properties)-laghu (light) and snigdh (slimy), Rasa (taste)-tickt (bitter), Virya (potency)-ushan (hot).

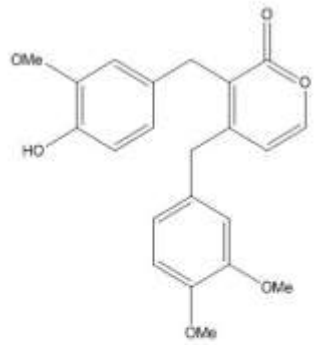
Table 1: Chemical composition of plant [13]

Element	Percentage
C (Organic Carbon)	83.50
N (Nitrogen)	0.28
P (Phosphorus)	0.055
K (Potassium)	0.60
Ca (Calcium)	2.60
Mg (Magnesium)	0.017

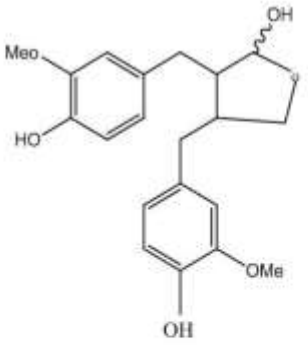
All parts of plant useful in curing diseases like inflammation, insomnia, cough, fever, urinary discharges, itching, tuberculosis, ophthalmic disorders, disorders of mind, diseases of the skin and of the blood. The leaves of these plant help in reducing inflammation. The wood act as expectorant and useful in curing piles, epilepsy, stones in the kidney and bladder, useful in fevers and in many other disorders. The oil is antiseptic in nature and helpful in curing skin diseases, wounds, urogenital diseases, diaphoretic as well as insecticide. It may also cure fungal diseases and act as sedative and cardio tonic too (Table 1) [14].

Chemical constituents

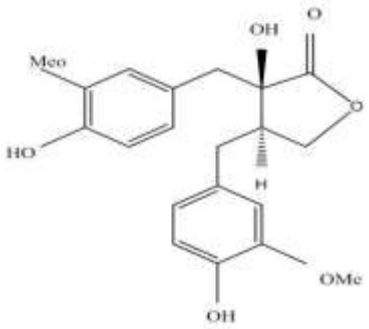
Cedrus deodara has been studied by lot of researcher and they concluded that there are lot of essential constituents of high range of structure are seen in Figure 2. The chemicals in wood are wikstromal, matairesinol, dibenzylbutyrolactol,1,4-diaryl butane, benzofuranoid neo lingam [15], cedrin (6-methyldihydromyricetin), taxifolin, cedeodarin (6-methyltaxifolin), dihydromyricetin, cedrinoside [16], deodardione, diosphenol, limonenecarboxylic acid [17], (–)-matairesinol, (–)-nortrachelogenin, and a dibenzylbutyrolactollignan (4,4',9-trihydroxy-3,3'-dimethoxy-9,9'-epoxylignan) [18]. A new dihydroflavonol named deodarin(3,4,5,6-tetrahydroxy-8-methyl dihydroflavonol) has been isolated from the stem bark [19]. The extract of *C. deodara* needle (Ethanolic extract) showed the presence of lot of compounds viz. 10-nonacosanol, dibutyl phthalate, protocatechuic acid, phthalic acid bis-(2-ethylhexyl) ester, (E)-1-O-p-coumaroylbeta-D-glucopyranoside and 5-p-trans-coumaroylguinic acid, 9-hydroxy-dodecanoic acid, ethyl laurate, ethyl stearate, 3-betahydroxy-oleanolic acid methyl ester, beta-sitosterol, shikimic acid, methylconiferin and ferulic acid beta-glucoside [20,21]. The essential oil of wood contain a sesquiterpenes-L II: Isohemacholone and sesquiterpenes L III: deodarone, atlantone [22], α-himacholone, β himacholone [23,24], ά-pinene, β-pinene, myrcene [25], himachalene, cis-atlantone, ά-atlantone [26].



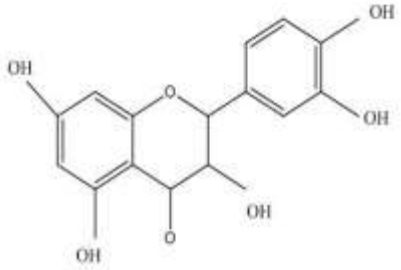
(-) Matairesinol



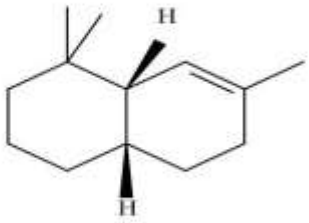
Dibenzylbutyrolactol



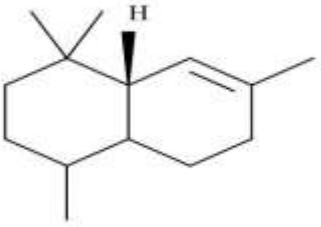
(-) Wikstromal



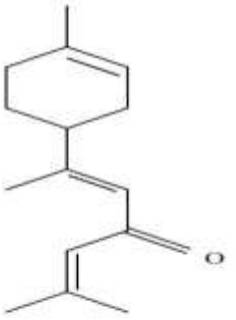
Taxifolin



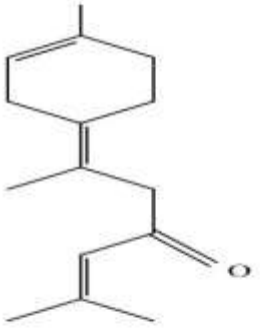
α-Himachalene



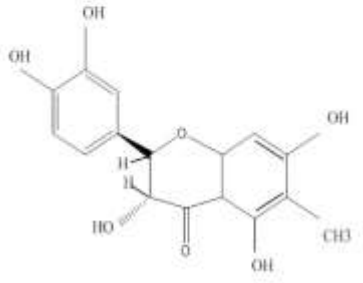
β-Himachalene



(E) – α-Atlantone



(E) –Ɣ - Atlantone



Cedeodarin

Figure 2: Essential components of *Cedrus deodara*

Pharmacological activity

Many pharmacological activities of *C. deodara* have been reported *in vivo* and *in vitro*. Various parts of this plant bear anti-inflammatory, immuno modulatory, antispasmodic, anticancer, antiapoptotic, antibacterial as well as other activities.

Anti-inflammatory activity

The oil extract of wood was used for its oral anti-inflammatory activity. The extract showed significant result in induced rat paw edema process [17]. The oil extract (Volatile) was also studied for its anti-inflammatory activity by the process of induced arthritis. The extract showed significant result here too [27,28].

Analgesic activity

The oil of wood of *C. deodara* was studied for its analgesic potential by acetic acid induced writhing response and hot plate reaction time model in mice. Aspirin and morphine were used as reference control for study. Wood oil of *C. deodara* showed significant analgesic activity in both levels of study [29].

Immunomodulatory activity

Models like neutrophil adhesion test in rats were used for studying volatile oil of wood of *C. deodara* in immunomodulatory activity [30]. Reaction of Athrus reaction in mice [31], SRBC-induced delay type hypersentivity (DTH) in mice [32,33] and oxazolone-induced contact hypersensitivity in mice [34].

C. deodara oil of wood helps in inhibiting the adhesion of neutrophils to nylon fibers which are responsible for the simulation of blood vessels in the cells (margination). This shows that the *C. deodara* wood oil lessens the amount of neutrophils in turn decreasing phagocytosis action and also the release of various enzymes that make inflammation even more worsen [33].

C. deodara wood oil significantly shows the inhibition for Arthrus reaction due to inhibitory effect characterized in the following reaction: Formation of precipitation of an immune complex at the site of injection, Activation of compliment system, neutrophil aggregation, release of lysosomal enzymes etc [35]. In the early event hypersensitivity reaction to oxazolone, mast cell degranulation has been reported [36]. It is due to mast cell stabilization. This proved that *C. deodara* oil manly of wood produces and inhibitory effects on humoral as well as cell-mediated immune responses and hence shows lot of usefulness in curing inflammatory diseases.

Antispasmodic activity

Himachalol is one of the chief constituent of wood of *C. deodara*, which likely to have antispasmodic activity. The pharmacological studies of himachalol on different isolated smooth muscles (Rat uterus, pig ileum and rabbit jejunum) and against various other agonist's histamine, serotonin, nicotine, acetylcholine etc., proved spasmolytic activity. This antagonist activity had no relaxing effect when given alone. Himachalol had much faster and better action as compare to papaverine which compared to Himachalol. Intravenous injection of Himachalol when given to cat produces a dose dependent fall in blood pressure and also causes an increased femoral blood flow [24].

Antioxidant activity

Brain and nervous system are mainly the two parts of our body which are highly prone to free radical damage as our nervous system and brain are rich in lipid and iron. *C. deodara* was known and also evaluated to have high antioxidant property [37]. Fractionation and purification are the two processes which are involved in the identification of antioxidant components mainly from dried heart wood powder of *C. deodara.*

Anti-malarial activity

Oil from the *C. deodara* was studied for bioactivity against the adults of *Culexquinue fasciatus* and *Aedesaegypti.* Various Wood chips of *C. deodara* were used to get essential oils which are useful in antimalarial activity. There is an apparatus use to crush wood chips to get essential oils is Clevenger's. Adults of *Aedes aegypti* were mostly insensitive to essential oil of *C. deodara.* Plants showed moderate activity [26].

Antiallergic activity

Various phytochemical investigations proved that various medicinal as well as essential constituents of the plant are responsible for curing different diseases e.g. Himachalol is one of the best constituent with anti-allergic property [38].

Insecticidal activity

Himalayan cedar wood oil fractions and chromatograph were bio assayed against the pulse beetle (*Calloso bruchusanalis* F.) and the housefly (*Musca domestica* L.). All fractions showed insecticidal activity. Evaluation of fractions I and V and β-himachalene (naturally occurring) sesquiterpenes indicated mortality against the pulse bettle. These natural products of plant serve suitable for the development of commercial insecticides [39].

Antihyperglycemic activity

The ethanolic extract of wood of *C. deodara* possesses antihyperglycemic activity mainly on streptozotocin-induced diabetic rats from 1 to 7 h. Lowering of blood pressure was found at 7 h treatment [40]. Plant shows 6% fall in blood glucose profile in single dose experiment on streptozotocin-induced diabetic rats [41-43]. Antihyperglycemic preparation was also obtained and evaluated from the ethanolic extract of *Cedrus deodara* [44].

Antisarcoptic mange activity

C. deodara proved to contain two commonly acaricidal drugs that are OCD and Benzyl Benzoate (BB), respectively, which are used to cure infection of Sarcoptesmites. These drugs are applied on effected part in alternative days and recoveries in skin lesions were observed. Blood samples were also collected and analyzed after every 10 days of Post Treatment (PT). *C. deodara* oil was more effective in controlling sarcoptic mange in sheep [45].

Anticonvulsant activity

Alcoholic extract of heart wood of plant *C. deodara* was studied for its highly anticonvulsant activity by Pentylenetetrazole (PTZ) induced and

Maximal Electro Shock (MES) induced in mice. The alcoholic extract showed increase in the onset of tonic seizures in PTZ and also decrease in the time of tonic extensor phase in MES. Modulation of GABA level were estimated when administered in rat brain and showed significant result. This proves that alcoholic extract of *C. deodara* have significant anticonvulsant activity through GABA levels in brain [46,47].

DISCUSSION AND CONCLUSION

Herbal medicines are considered as a rich source of medicines which can be used in drug development and synthesis. These herbal medicines play an important role in the development of human culture around the whole world. Herbal medicines have been proved better and even best against allopathic medicines. From the present review it is clear that *C. deodara* have many qualities and features including anti-inflammatory, antitumor, anti-bacterial, antifungal and various other and possesses great influence on nervous system. Various studies can be conducted in multiple animal based models for understanding their mechanism of action.

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