

# TRADITIONAL USES AND PHARMACOLOGICAL ACTIVITIES OF CLAMMY CHERRY – A REVIEW

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## ABSTRACT

Plants have been used for thousands of years to flavour and conserve food, to treat health disorders and to prevent diseases including epidemics *Cordia obliqua* is also called as clammy cherry. It is a flowering plant species in the genus *Cordia* belonging to the family Boraginaceae. It contains about 2700 species of trees and shrubs, that are found worldwide, mostly in warmer region. *Cordia obliqua* is a medium-sized deciduous tree, found scattered throughout the mid-Himalyas up to elevations of 1,470 meters. It shows vigorous growth. Traditionally, Local people use *Cordia obliqua* in different ways depending on religious belief, culture, ceremony, topography and vegetation, pickles, gums, traditional ceremonies and also has a potential medicinal values. In addition clammy cherry has well documented pharmacological activities. So this article will be useful for researchers in various fields like herbal or plant based research.

**Keywords:** Clammy cherry, Traditional uses, Medicines, Researchers, Pharmacological activities.

## INTRODUCTION

About 300 species of genus *Cordia* have been identified worldwide. There are 13 species of this genus found in India [1,2]. One of them is *Cordia obliqua* Willd. [3,4] belonging to the family Boraginaceae family consists of about 2,700 species, which are distributed in tropical, sub-tropical and warmer regions around the world. It is a medium size deciduous tree, 10.5 meters high, the girth of trunk full bearing tree being 75.5 cm, branchlets glabrous, wood soft, light grey, no heartwood, leaves are alternate, flowers are bisexual and fruit is drupe. There are two forms of *Cordia obliqua* Willd., which are found in Himachal Pradesh and the major difference in between these two forms is the size of their fruits, one have smaller fruit than other. Traditionally *Cordia obliqua* has been used for different ways and mainly used for medicine of cough suppressant, astringent, analgesic, anti-inflammatory, anthelmintic, antimalarial, diuretic, febrifuge, hepatoprotective, antimicrobial, respiratory stimulant, appetite suppressants and to treat ulcers, head-ache, urinary tract infections, lung disease, spleen, urethra and leprosy. Chemical compounds isolated from various parts of *Cordia obliqua* are Hesperetin-7-rhamnoside from roots, betulin and betasitosterol from seeds[5], natural gums and mucilage from fruits and flavonoids from stem bark, all these have high potential therapeutic value.

## ORIGIN AND DISTRIBUTION

It is a medium-sized deciduous tree, found scattered throughout the mid-Himalyas up to elevations of 1,470 meters. It shows vigorous growth. There are two forms of *Cordia obliqua* Willd., which are found in Himachal Pradesh and the major difference in between these two forms is the size of their fruits, one have smaller fruit than other. It is widely distributed nearly the whole of the warmer parts of India and Ceylon. Also found in other parts of the world like Philippines, New Guinea, Hainan, Formosa, Java and Tropical Australia. It is a is a medium sized deciduous tree, 10.5 meters high, the girth of trunk of a full bearing tree being 75.5 cm, branchlets glabrous, wood soft, light grey, no heartwood [6].

## PLANT DESCRIPTION

*Cordia obliqua* leaves are simple, alternate, estipulate; petiole 25-50 mm long, slender, pubescent, grooved above, elliptic, ovate or orbicular; base acute, truncate, subcordate or rounded, apex acute or obtuse; margin entire or crenate, chartaceous, glabrous above, tomentose beneath; nerves 3-5 from the base, palmate, lateral nerves 4-7 pairs, prominent, pinnate, tomentose beneath especially on the axils of nerve; intercostae scalariform, prominent. Flowers are bisexual, complete, short-stalked, actinomorphic, white and glabrous. Fruit is drupe, when ripe yellowish brown, pink or nearly black, shining but minutely rugose, endocarp rugose, very hard, in a sweetish viscid, almost transparent pulp. Epicarp is thick while mesocarp is mucilaginous and endocarp is hard and stony. Each stone contains two seeds, which are separated by a stony septum. The seeds are mildly sweet in taste. The flowering starts during the last week of April and continues till the end of May. The fruiting season lasts from the beginning of July to the end of August.



Figure 1. *Cordia Obliqua* Willd.



Figure 2. Fruits of *Cordia Obliqua* Willd.

## TRADITIONAL AND MEDICINAL USES

Local people use *Cordia obliqua* in different ways depending on religious belief, culture, ceremony, topography and vegetation. *Cordia obliqua* is used for vegetables, pickles, gums, medicines for traditional ceremonies. The fruit is sweet and have effects like slightly cooling, anthelmintic, purgative, diuretic, expectorant, and useful in diseases of the chest, urethra, dry cough and also used as a cough suppressant, astringent, analgesic, anti-inflammatory[7], antimalarial, febrifuge, hepatoprotective, antimicrobial, respiratory stimulant, appetite suppressants and to treat urinary tract infections and leprosy. biliousness and chronic fever. It lessens thirst and the scalding of urine, removes pains in the joints, bad humours, burning of the throat and also good in diseases of the spleen (As per Yunani system). According to ayurveda, it is valuable in all diseases of lungs. The juice of the bark is given in gripes, along with coconut oil. The bark and unripe fruit are used as a mild tonic. The kernels are a good remedy in treatment of ringworm. The leaves are useful as an external application to treat ulcers and headache. The Santals use a powder of the bark for external application in prurigo. The Javanese use the bark in treatment of fevers. A good pickle is prepared from its raw fruits and these are also used as vegetable[8]. The fruit mucilage is used as a gum for pasting cardboard and paper sheets.

## PHARMACOLOGICAL ACTIVITIES

Traditionally a number of activities are reported from various parts of this plant. A few of them are scientifically proven. Some of the reported studies are following:

### Anti-inflammatory activity

Chemical examination of the seeds of *Cordia obliqua* has resulted in the isolation and characterization of alpha-amyrin, betulin, octacosanol, lupeol-3-rhamnoside, beta-sitosterol, beta-sitosterol-3-glucoside, hentricontanol, hentricontane, taxifolin-3, 5-dirhamnoside and hesperetin-7-rhamnoside. The anti-inflammatory activity of the isolated compounds were determined. *Cordia* genus is well known in herbal medicine for its anti-inflammatory activity. It is taken internally and as well as applied topically for various types of inflammatory conditions. A study was carried out on various isolated constituents from *Cordia obliqua* seeds to find out anti-inflammatory [9] effect and it showed potent anti-inflammatory action of these seed constituents.

### **Hypotensive and respiratory stimulation activity**

The comparative pharmacological activity of Cordia fruit mucilage at different stages of maturity was investigated to determine the stage at which active substances were present in high proportions. The fruit mucilage of ripe and unripe Cordia myxa (RCm and URCm) decreased rabbit arterial blood pressure in a dose dependent manner without affecting the respiratory rate. Mucilage from both ripe and unripe Cordia obliqua (RCo and URCo) decreased rabbit blood pressure and stimulated the respiratory rate. RCm is 12.37-fold more potent as a hypotensive agent than RCo. However the respiratory stimulant effect of RCo is 7-fold more than its own hypotensive effect. Investigation of the mode of action revealed that the hypotensive effect was more likely due to activation of parasympathetic ganglia and dilatation of peripheral blood vessels, whereas the respiratory stimulant effect may partly be due to activation of chemoreceptors in the aortic arch and carotid body. In addition, a subeffective dose of the ripe fruit mucilage specifically antagonized nicotine-induced hypotensive effect on rabbit and nicotine ganglionic stimulant effect on the isolated guinea pig ileum. This is the first report on the comparative pharmacological activity of Cordia mucilage at different stages of fruit maturity. This information may allow the use of the ripe fruit mucilage of Cordia obliqua as a respiratory stimulant and that of Cordia myxa as a hypotensive agent. [10].

### **Antimicrobial activity against oral pathogens**

This study suggests that methanolic fraction from seeds and leaves of Cordia obliqua possesses significant antimicrobial activity at very low concentration (20ug/disc) on oral pathogenic strains of Gram-positive bacteria such as Streptococcus mitis can cause infective endocarditis[11], Streptococcus mutans is a significant contributor to tooth decay and Streptococcus sanguinis is found in dental plaque, Gram-negative bacteria such as Porphyromonas gingivalis is found in oral cavity, where it is implicated in periodontal disease[12]. Tannerella forsythia is a member of the red complex of periodontal pathogens[13] and Actinobacillus actinomycetemcomitans causes periodontitis and fungal strain like Candida albicans is an opportunistic human fungal pathogen that causes candidiasis[14]. The activity of methanol extract was compared with standard antibiotics Gentamycin, Chloramphenicol, Ciprofloxacin, Erythromycin and Fluconazole. The methanolic extract from leaves and seeds of plant Cordia obliqua as a potential antimicrobial agent in prevention of oral infections and diseases [15].

### **Antimicrobial activity against cariogenic pathogens**

The study explored the antimicrobial activity of methanol, ethanol and distilled water extracts of six Indian medicinal plant species growing in different kind of habitats. These plant species showed different range of antimicrobial activity against test microorganism (Streptococcus mutans, Staphylococcus aureus, Candida albicans, Lactobacillus acidophilus and Streptococcus gordonii). Out of these six plant species Dahlia could serve as broad spectrum antibiotic whereas plants such as Bombax ceiba and Cordia obliqua could serve as narrow spectrum antibiotics[16].

### **Diuretic activity**

A study was carried out on 266 identified plants from 222 plant families for various biological activities. In this study, Cordia obliqua var. wallichii plant of family Boraginaceae, was also studied. The fruits were used to study various activities like antiprotozoal, antiviral, CNS effects, antifertility, effects on respiration, diuretic activity and other. They reported diuretic activity with LD50 > 1000mg/kg body weight of mice [17].

### **Wound Healing Activity**

A study was carried out to evaluate wound healing potential of the aqueous and methanolic extract of the seeds and leaves of Cordia obliqua. Three models (incision, excision and dead space wound) were used to evaluate healing activity of the extracts. Wounds are created to the rats (albino rats), in excision model both the extracts were applied till epithelialization process completed. On other hand in incision and dead space wound model extracts were applied daily (topically) till 10th day after wound formation. While standard group was treated with povidone iodine ointment topically. Observation was carried out for percentage of wound contraction, breaking strength, epithelialization period, hydroxyproline content and granulation weight. Both the extracts provided significant results ( $p < 0.05$ ) as compared to the standard control group. Methanolic extract is more effective than the aqueous extract, but both the extracts were able to decrease epithelialization period, increase percentage wound

contraction in excision model. In dead space model both the extracts increased hydroxyl proline content, and also increased breaking strength in incision model[18].

### **Antidiabetic, Antihyperlipidemic and Antioxidant Property**

Acute toxicity of methanolic extract of *Cordia obliqua* did not show toxicity and death up to a dose of 2000mg/kg in rats. MECO 200mg/kg and 400 mg/kg doses significantly ( $P<0.005$ ) reduced blood glucose levels in Oral glucose tolerance test. Both the doses methanolic extract of *Cordia obliqua* treatment significantly ( $P<0.005$ ) increased the body weight, HDL by dose dependently when compared with Streptozotocin treated rats. Also, methanolic extract of *Cordia obliqua* treated rats significantly ( $P<0.005$ ) decreased the blood glucose, SGOT, SGPT and ALP when compared with Streptozotocin treated rats. Normalized the lipid, antioxidant levels were reversed to near normal in diabetic rats treated with methanolic extract of *Cordia obliqua*. From the above results it was concluded that the plant extract having the ability of managing hyperglycemic and complication of diabetes in Streptozotocin induced diabetic rats. Hence this plant may be considered as one of the source for the isolation of new oral anti hypoglycemic agent[19].

### **OTHER ACTIVITY**

#### **A Novel Matrix Forming Material for Enteric resistant and Sustained Drug Delivery**

The past research acknowledged the use of gum cordia as a potential non-toxic and safe pharmaceutical excipient (binding agent) in tablet [20]. These particulars explicate the rationale, why proposed article concerns the evaluation of natural gums for sustained drug delivery. In the present study, an effort has been made to evaluate the efficacy of gum cordia (obtained from *Cordia Obliqua*, Willd.,) as a novel sustained release matrix forming material in tablet formulations using diclofenac. Diclofenac is used for long-term treatment of various arthritic conditions [21]. However the drug has a short biological half-life which needs multiple dosing regimens of immediate-release formulations and requires sustained release formulation for patient compliance. A study was carried out to evaluate the efficacy of gum obtained from *Cordia obliqua* Willd. plant as a novel sustained release matrix forming material in tablet formulations using diclofenac. The Cordia gum was obtained from fresh and raw fruits mucilage, which was expressed from fruits by tincture press. Matrix tablets were prepared by wet granulation technique using non aqueous solvents. The effect of gum in various concentrations on in-vitro drug release profile was examined and it was compared with commercial sustained release diclofenac formulation (Voveran SR-100). The results showed that the formulation containing 2% w/w gum, gave a similar dissolution profile as to the marketed product and it obeys first order kinetics. So this study concludes the efficacy of *Cordia obliqua* gum as sustained release matrix forming material[22].

### **CONCLUSION**

Plants are the “backbone” of traditional medicine and plays a key role in world health. Medicinal herbs or plants have been known to be an important potential source of therapeutics or curative aids. The use of medicinal plants has attained a commanding role in health system all over the world. This involves the use of medicinal plants not only for the treatment of diseases but also as potential material for maintaining good health and conditions. Some people value these plants due to the ancient belief which says plants are created to supply man with food, medical treatment, and other effects. There are nearly 2000 ethnic groups in the world, and almost every group has its own traditional medical knowledge and experiences. On basis of our study, Traditionally *Cordia obliqua* have been used for various purposes such as religious belief, culture, ceremony, topography, vegetation, vegetables, pickles, gums and medicines and also it has well documented pharmacological activities. On the other hand, this article will be helpful for researchers to isolate a new compounds and innovate more pharmacological activities in Clammy cherry.

### **CONFLICT OF INTERESTS**

No conflict of interests



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