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# A SHORT REVIEW ON MEDICINAL USES AND PHARMACOLOGICAL ACTIVITIES OF *COCCULUS LAURIFOLIUS* LEAVES

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## ABSTRACT

*Cocculus laurifolius* (laurel leaf snail seed) belongs to family Menispermaceae is a medicinally active plant and have been traditionally used as a muscle relaxant, diuretic, antihypertensive and antiepileptic. Consequently the plant have been studied for its biological activities and has been shown to possess antimicrobial, antioxidant, antifungal, hypotensive, anxiolytic, antidepressant, anticonvulsant, sedative/hypnotic and neuromuscular blocking properties.

**Keyword:** *Cocculus laurifolius*, ethanolic extract, anxiolytic activity, antioxidant properties, hypotensive effect.

## INTRODUCTION

Herbal medicines are considered to be an effective therapy for treatment of different ailment and disorders. Phytotherapy include plants with mild action, like mint and chamomile to potent medicinal plants *Belladona* and *Digitalis* (1). These medicinal plants are used in the treatment of wide diversity of health problems, including minor injuries, cardiac, respiratory and central nervous system disorders to severe carcinogenic conditions (2). Plants of family Menispermaceae have also been reported for their medicinal activity (3).While species of genera *Cocculus* (*Indicus, hirsutus* and *pendulus*) have found significant importance due to their anti-diabetic, anti-bacterial, anti-ulcer, anti-cancerous, anti-hypertensive, ant-inflammatory, diuretic, analgesic and anxiolytic activity(4-9). Similarly, the plant of *Cocculus laurifolius* have also been reported for its muscle relaxant and hypotensive activity.

*Cocculus laurifolius* also known as laurel leaf snail seed, belongs to the family Menispermaceae. The plant is an evergreen shrub to small tree 1-2 m tall with elliptic or lanceolate-elliptic leaves, flowers are pale greenish and fruits are black in color with globose structure. This shrub is native to Japan and China, however, it has been widely distributed in Pakistan, Indonesia, South East Asia, India, Taiwan, Malaysia, in open forests of NW Hunan, Myanmar and Taiwan (10, 11).


***Fig1: Cocculus laurifolius (a) in its natural habitat; (b) fruit; (c) flower; (d) leaves; (e) seeds***

**Traditional uses**

The plant has been traditionally used in the treatment of rheumatic pain, epilepsy, hypertension, abdominal pain, headache, and in the healing of scalp wounds (12). However, in some regions of America and Europe it has been used as an ornamental plant(13)

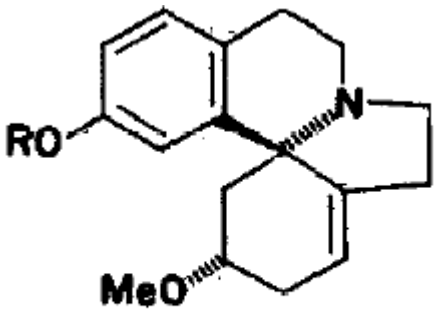
**Phytochemistry**

The plant has undergone extensive phytochemical studies and variety of chemical constituents have been isolated from the leaves of *Cocculus laurifolius*. The phenolic extraction of leaves of *Cocculus laurifolius* lead to the isolation of different active alkaloidal contents. Alcoholic fraction of leaves resulted in isolation of laurifinine, laurifine and laurifonine (14). Similarly, in a later study identification and stereochemistry of Erythroculine was explained (15).

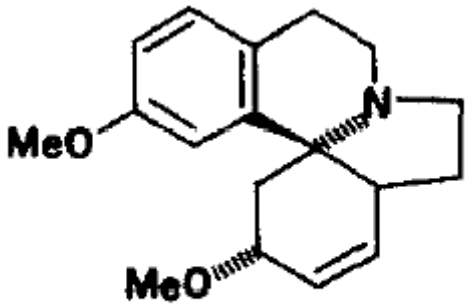
Meanwhile, different Erythrina alkaloids Coccuvine, cocculine, isococculidine, cocculitinine, coccudienone, isococuline, have also been isolated from ethanolic fraction of leaves extract (16-19). In addition to these leaves also contain alkaloids sebiferine a morphinandienone. Quaternary apoporphines, boldinemethochlorides, magnoflorine, chlorides, benzylisoquinolines, reticuline, O-meth-methylcoclaurine and laudanidine have also been isolated from ethanolic extract of leaves. A part from these constituents, phenolic extract of leaves also contain N-methystepharine, stepharine and some proaporphines.

In another study, biosynthesis of secondary alkaloid isotetrahedron from *Cocculus laurifolius* have also been demonstrated(20). Similarly, sinactine, thalicarpine, sebiferine, tetrahydropalmatinesand a novel alkaloid bisbenzylisoquinoline (tetrandrine) have also been synthesized from *Cocculus laurifolius* (21-25).

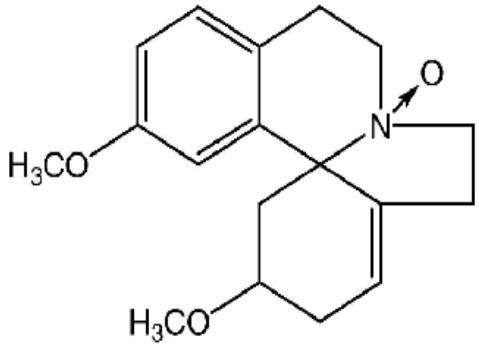
In a recent study leaves of *Cocculus laurifolius* have been extracted with different solvents; chloroform, methanol, petroleum ether and distill water. The phenolic, chloroform and distill water extract of leaves and bark showed higher content of phytochemicals. The study illustrated that leaves and bark of the *Cocculus laurifolius* contain rich amount of alkaloids, flavanoids, tannins, saponins and phenolic contents (26).



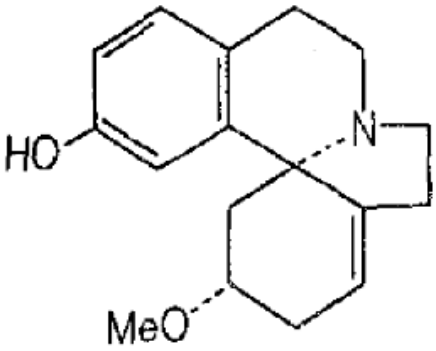

Cocculine



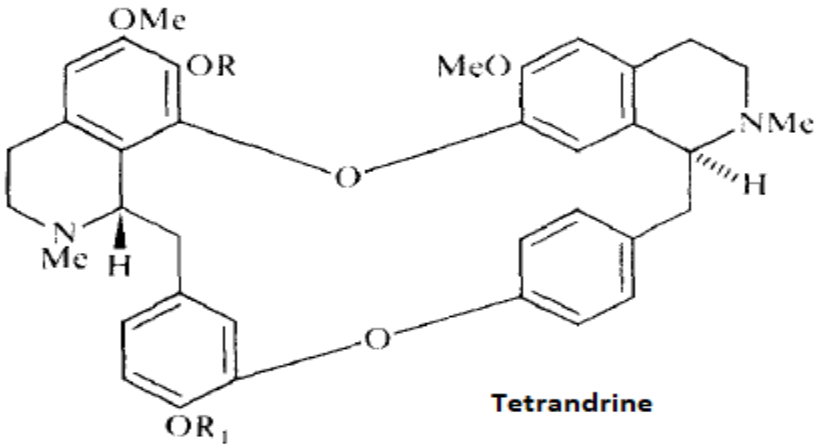

Isococculidine




N-Oxide of coculidine




Coccuvine




Tetrandrine

***Fig 2: Chemical structures of various phytoconstituents isolated from Cocculus laurifolius***

## Pharmacological Studies

### Antimicrobial Activity

The methanolic and chloroform extract of *Cocculus laurifolius* leaves were found to be effective against E.coli, P.aeruginosa, S.aureus and B.subtilis with a maximum zone of inhibition. While another study reported pronounced biocidal activity of *Cocculus laurifolius* water and ethanolic extract against *Xanthomonascampestris*, *Bacillus subtilis*, and *Streptomyces albogriseolus*subsp.89(27). On the other hand the plant showed poor to average antifungal activity against A.niger and F.solani organisms(26).

### Antioxidant Activity

The antioxidant activity of chloroform and methanolic extract illustrated by Total phenolic contents (TPC), Metal chelating (MC) and Total antioxidant activity (TAA). The methanolic extract of leaves showed considerably higher total antioxidant activity.

**Hypotensive Activity**

Previous studies on 50 % ethanolic extract of *Cocculus laurifolius* leaves explained substantial hypotensive effect in rabbits, cat and dogs. Later on, another study demonstrated that the hypotensive effect was produced by quaternary bases by acting on sympathetic and para-sympathetic pathways via ganglion blocking action(28).

**Neuropharmacological Activity**

*Neuromuscular blocking effect*
Previously 50% ethanolic extract of *Cocculus laurifolius* have been reported to possess substantial neuromuscular blocking activity. The study also explained that this activity have been attributed by a quaternary alkaloid (isocorydinemethochloride) of the plant(29)

**Anxiolytic effect**
In addition to other activities *Cocculus laurifolius* leaves have considerable effect on central nervous system. The ethanolic extract of leaves after oral administration at doses 200 and 400 mg/kg produce significant anxiolytic activity in mice in elevated plus maze, light/dark paradigm, open field paradigm and hole-board. The extract was evaluated for anxiolytic activity in different day of test sessions after acute and chronic administration.

**Anti-depressant effect**
The anti-depressant effects of ethanolic extracts of *Cocculus laurifolius* leaves was studied by two evaluation test in mice, namely the forced swim and the tail suspension tests. Ethanolic extract decrease the immobility time at dose 200 and 400 mg/kg, similar to that of fluoxetine 20 mg/kg. Extract showed significant decrease in immobility time in both tests after 1, 7, 15 and 30 days of treatment.

**Sedative/hypnotic effect**
Meanwhile, sedative & hypnotic effect of ethanolic extract of leaves was determined by pentobarbital induced hypnosis in mice. The result of experiment shows that extract at dose 400 mg/kg significantly decrease the onset of sleep while considerable prolongation in sleep was observed.

**Anti-convulsant effect**
The anti-convulsant effects of ethanolic extract of *Cocculus laurifolius* leaves was studied by strychnine induced seizures test in rats. The extract prolonged onset of convulsions with a decrease in duration of convulsions at dose 200 and 400 mg/kg. Moreover, the mortality rate of animal have been noticeably decrease at different days of test sessions, with an increase in number of days of treatment with extract. While the histopathological evaluation illustrated significantly protective neuronal structures at dose 200 and 400 mg/kg in comparison with control.

**Toxicity Study**
To evaluate the toxicity profile of *Cocculus laurifolius*, the ethanolic extract of leaves was orally administered to mice at dose 5, 50, 300 and 2000 mg/kg. Animal were observed for 24 hours for

any physical, physiological and behavioral changes. The ethanolic extract of *Cocculus laurifolius* leaves did not produce any sign of toxicity and mortality up to maximum dose 2000 mg/kg.

## CONCLUSION

From centuries phytomedicines have been considered as major part of treatment to restore health and quality of life. Presently few studies have been conducted on the medicinal and pharmacological activities of *Cocculus laurifolius*. Further investigation is required to elucidate the undiscovered and undeveloped therapeutic potential of plant and its phytochemicals.

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