



***Embelia ribes*: A valuable medicinal plant**

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ABSTRACT

Medicinal plants were used to cure human ailments in every possible condition. The use of medicinal plants in therapeutics most probably exist the earliest documented history. Embelia ribes is one of most significant medicinal plant. Almost every part of this plant contains varied chemical constituents and is used in the treatment of various. Extensive research work has been reported in last few decades on this valuable plant. This review deals with state-of-the-art pharmacological activity reported on Embelia ribes.

Keywords: *Embelia ribes*, *E.ribes*, Embelin, Vidanga, Myrsinaceae.

INTRODUCTION

Dried fruits of *Embelia ribes* (*E.ribes*) belong to family Myrsinaceae is one of the most significant plants used from the prehistoric time in the form of the drug Baibidanga or Vidanga. [1] It has been used as an ingredient in most of the Ayurvedic formulation for the treatment of various ailments. Various formulation of *Embelia ribes* are used in ayurvedic system of medicine like asava, arishta, lauha and taila [2]. Commonly it is known as false black pepper. It is listed in red book as threatened species. In various literatures, it is found that the fruits of that plant used as an anthelmintic, diuretic, carminative, contraceptive, anti-bacterial, anti-inflammatory astringent, antioxidant, anticancer agents and seed possessed antibiotic and antitubercular properties [3].

Synonym: Laksmana, Amalaki, patala, Vidanga, Tandula, Gahvara, Vella [4].

Habitat: It is an indo-malaysian species [4]. Distributes throughout mountainous region of India up to an altitude of 1500 m, mainly in states of Maharashtra, Karnataka, Kerala in Western Ghats and Tamil nadu in Eastern Ghats [5]. It is reported that the plant is in threat in Karnataka and Maharashtra and at a little danger position in Kerala [6].

Botanical description: It is bulky shrub with long slender. Leaves are alternate, simple, smooth, elliptic-lanceolate, broad, obtusely acuminate, entire, and shiny above. Stem are whitish grey and roots are brownish grey. flowers are small, white or greenish, in both terminal and axillary panicles. Plant generally flowers during February-April. Fruits are globose in shape, dull red to nearly black, a short pedicel often present, wrinkled or warty, usually one seeded. Fruits mature during may-august. Transverse section shows epicarp are composed of tabular single row of cells of epidermis [4,6].

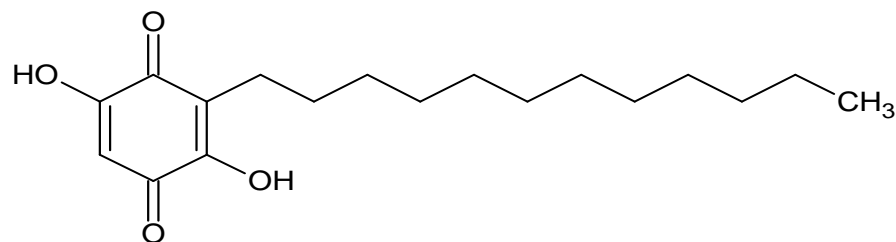
Part used are: fruits, roots, seeds and leaves.

PHYTOCONSTITUENTS

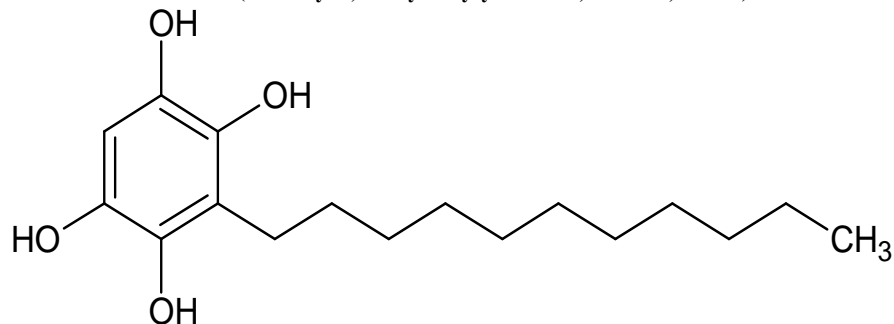
- 1) Phenolic compound:** Quinones derivatives
Embelin, Embelinol, Embeliaribyl ester and Embeliol and Vilangin
- 2) Flavanoid:** Quercitol
- 3) Alkaloids:** Fruit contains christembine

4) **Steroids:** Sitosterol and daucosterol

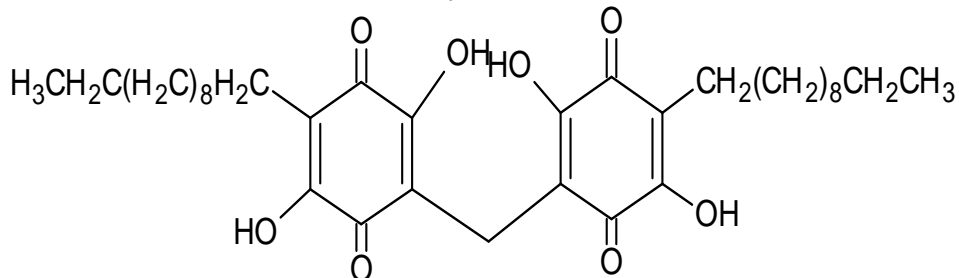
5) **Other constituents:** Tannin, fatty substances, resinoid and volatile oil, phenolic acids like vanillic acid, cinnamic acid, caffeic acid, chlorogenic acid, and o-cumaric acid [1,2,7].



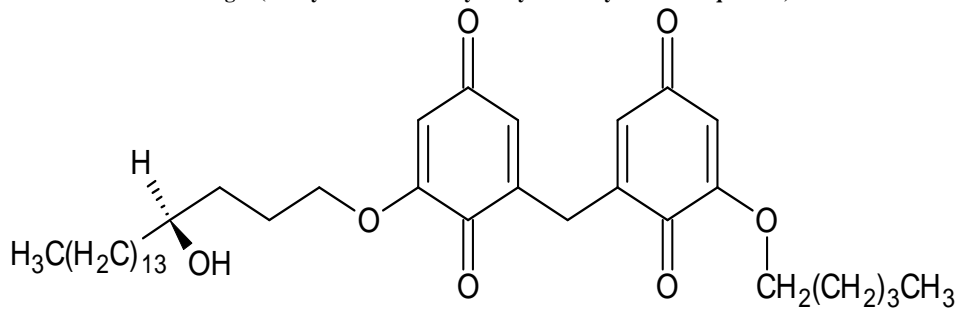
Embelin (3-dodecyl-2,5-dihydroxycyclohexa-2,5-diene-1,4-dione)



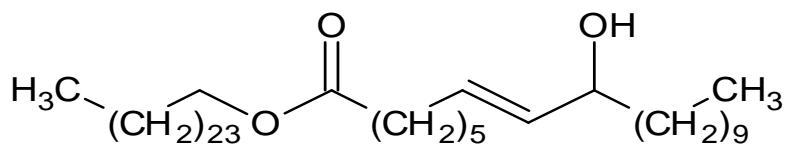
Embeliol (3-undecylbenzene-1,2,4,5-tetrol)



Vilangin (methylene-bis-2,5-dihydroxy-4-undecyl-3,6-benzoquinone)



Embeliaribyl ester (n-pentacosanyl-n-nonadeca-71-en-91-alpha-ol-11-oate)



Embelinol

Ancient Uses:

Paste of *Embelia ribes* reduces cavities and skin associated disease. It is being used in indigestion, constipation, paralysis, convulsions, epilepsy, wormal infestation, infections in body. It also helps in blood purification and healing of wound [4].

Adverse reaction: It has been reported that the natural occurring *Embelia ribes* cause optic atrophy among the Ethiopian population [8].

PHARMACOLOGICAL ACTIVITY

Antibacterial activity: Antibacterial activity of ethanol and aqueous extract of *E. ribes* was determined against *Pseudomonas aeruginosa*, *Escherichia coli*, *Streptococcus faecalis*, *Bacillus subtilis*. The aqueous as well as ethanolic extracts of *E. ribes* posses noteworthy activity against gram-positive and gram negative bacteria. Among the embelin derivatives, CONHNHCOCH₃ and PNO₂C₆H₄ compound were active against *P.vulgaries* and *B.subtilis*. Embelin showed bactericidal and bacteriostatic activity against Gram +ve and Gram -ve bacteria respectively[9, 10].

Anti inflammatory activity: Anti inflammatory activity of fruits of *Embelia ribes* as well as embelin is reported in carrageenan-induced paw edema [11].

Antifungal activity: Antifungal activity of petroleum ether, solvent ether, methanolic and aqueous extract of *Embelia ribes* was determined by EUCAST method against *Candida* species i.e. (*c.albican*227, *c.albican*183, *c.tropicalis*184, *c.parapsilosis* 1744, *c.fumigatus* 2550). And it was found that, Embelin showed the good inhibitory activity against *c.tropicalis*. [12]

Antioxidant activity: Embelin is a proven antioxidant in opposition to induced hepatotoxicity in rats. The flavanoids and phenolic compounds present in ethanol extract of *E.ribes* is responsible for activity. [13,14].

Anxiolytic activity: Anxiolytic activity was done by using behavioural parameter in elevated plus maze test, open field test and light and dark test. In elevated plus maze, the number of entries and percentage of time spend increased in open arm. Embelin showed the noteworthy anxiolytic activity. [15]

Anthelmintic activity: Anthelmintic activity of ethanol extract of fruits of *Embelia ribes* was determined by microwell plate assay against strain of free living roundworm *Rhabditis pseudoelongata*. At different concentration, the anthelmintic activity of seeds of *Embelia ribes* was studied and the concentration of 10-200 Ug/mL of *Embelia ribes* showed potent anthelmintic activity [16].

Antihyperlipidemic activity: Ethanolic extract of *E. ribes* has proven antihyperlipidemic activity and it reduces serum total cholesterol, triglycerides and increases the HDL levels in diabetic rats. [17]

Antidepressant activity: Antidepressant activity was carried out by administration of embelin via Intraperitoneal route to mice, 30 min earlier to initiation of experimental depression. It was found that embelin, have therapeutic potential to treat the mental depression [18].

Anticancer activity: X-linked inhibitor of apoptosis protein in induced HepG2 human hepatocellular carcinoma cells is inhibited by embelin. Cell viability revealing embelin induced the apoptosis was determined by MTT assay. Embelin drastically enhanced tumor response to X-ray in PC-3 xenograft model,. When area of solid tumour bearing mice was subjected to PDT (photodynamic therapeutic) with various concentration of embelin, noteworthy cytotoxicity reported in dose dependent manner [10, 19].

Cardio protective effect: Aqueous extract of *E ribes* considerably decreased systemic blood pressure, heart rate. I may also leads to increased levels of serum creatinine kinase, serum lactate dehydeogenase and significantly increased the myocardial endogenous antioxidants levels. [20]

Wound healing activity: Embelin treated group and ethanol extract were significantly showed wound healing activity. This activity of Embelin was demonstrated on Swiss albino rats. [21]

Antifertility activity: The root extract of *Embelia ribes* possessed antifertility activity. A clinical trial of oral contraceptive conducted shown that aqueous extract of *E ribes* showed 85% post coital antifertility. [1]

Antihyperhomocysteinemic activity: Antihyperhomocysteinemic activity of this plant was determined in Wistar rats. Methionine was used to induce hyperhomocysteinemia. Aqueous extract of *E ribes* shows hyperhomocysteinemic activity. It drastically decreased LDH, total cholesterol, homocysteine, triglycerides, VDL-C LDL-C and increased the HDL-C levels in serum [22].

Anticonvulsant activity: Embelin showed noteworthy inhibition of seizure induced by pentaprozole and electroshock in dose dependent way. It act on grand mal as well as petit mal epilepsy [23].

Antiallergic activity: Ethanol extract of fruits of *E. ribes* showed noteworthy decrease in difference in number of leucocytes and eosinophils count in milk induced leucocytosis and eosinophilia mice. It also decrease in degranulated mast cells count and increase in intact mast cells count in compound 48/80 induced mast cells degranulation in rats. The study of *Embelia ribes* may prove to be a potential treating allergic condition such as allergic asthma [24].

Antiobesity activity: Ethanol extract of *E. ribes* showed significant reduction in serum levels of leptin by 45%, insulin by 37%, glucose by 28%, total cholesterol by 18%, and triglycerides by 24% and HDL-C level increased by 31%. Furthermore extract of *Embelia ribes* decreased the myocardial lipid peroxidation and increased antioxidant levels in obese rats [25].

Hepatoprotective activity: The extract of *E. ribes* showd hepatoprotective activity in the mice Hepatocellular damage was induced by paracetamol. The mice treated with extract exhibit a dose dependent decrease in SGPT level. [26]

Antimitotic activity: Embelin and Embelin derivatives demonstrated antimitotic activity. [27].

Antiproliferative activity: Invitro studies of Hexane extract of fruit on Dalton's Lymphoma associated cells (DLA) and Human leukaemic cells (K562) suggest antiproliferative activity. [28]

Antidiabetic activity: Ethanol extract of *E. Ribes* fruits in streptozotocin induced diabetic rat significantly reduce the levels of blood glucose. [29]

CONCLUSION

The traditional use and research work on biological activity of *Embelia ribes* suggest that it could be used in treatment of several ailments. More research work should be carried out on isolated constituent.

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