

# Review on the Medicinal uses of *Elaeocarpus ganitrus* (Rudraksha)

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## ABSTRACT

*Elaeocarpus ganitrus*, commonly known for its spiritual and medicinal uses since ancient mythology, is a medium-sized tree cultivated as an ornamental plant throughout India and found in regions such as Nepal, Bihar, Bengal, Assam, Madhya Pradesh and Bombay. It holds significant value in traditional medical systems like ayurveda, siddha and unani. Historically, rudraksha has been utilized to treat various conditions, including liver diseases, asthma, hypertension, migraines, neuralgia, anxiety, depression, stress and epilepsy. In ayurvedic medicine, wearing rudraksha beads is believed to benefit the heart and nerves.

Research indicates that the ethanolic leaf extract of *Elaeocarpus ganitrus* contains gallic acid, ellagic acid and quercetin, while the aqueous leaf extract contains

glycosides.

Phytochemical screening reveals the presence of alkaloids, glycosides, phytosterols, carbohydrates, tannins, flavonoids, amino acids and saponins, terpenoids exhibit varying effects depending on the solvent used for extraction. The presence of these phytochemicals is reported to modulate oxidative stress levels, suggesting their potential utility in cancer management.

**Keywords:** *Elaeocarpus ganitrus*, Rudraksha, Pharmacological activity, Cancer, Tannins.

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## INTRODUCTION

*Elaeocarpus ganitrus*, commonly known as rudraksha in India, is a member of the Elaeocarpaceae family and is primarily grown in the Himalayan region (Dennis T, 2021).

The name rudraksha is derived from the sanskrit words rudra and aksha. This native shrub has a long and illustrious history of traditional medicinal applications. Revered as a holy tree, rudraksha is considered to be lord shiva's favorite (Hardainiyani S, *et al.*, 2015). It is mentioned in many ancient texts, including the padma puran, the devi bhagwat puran and the shiv puran. According to legend, the rudraksha tree was created from the tears of lord shiva.

There are approximately 360 species of *Elaeocarpus* found in regions such as Australia, East Asia, Malaysia and the Pacific Islands. Over 120 species exist throughout Asia, with 25 species identified in India alone. In Hindu mythology, rudraksha beads hold immense religious, spiritual and material significance (Sharma PV, 2006; Rauniar GP and Sharma M, 2012).

*Elaeocarpus ganitrus* is referred to as rudraksha in Sanskrit and rudrakine in Hindi. Various parts of the rudraksha plant including beads, bark, leaves and the outer shell of the beads are utilized in traditional medicine to treat a variety of ailments such as fever, skin conditions, mental disorders and wound healing. Rudraksha is also used to alleviate bronchitis, neuralgia, cephalalgia (headaches), anorexia, migraines and serves as a thermogenic agent, sedative and cough reliever (Chaturvedi BK, 2004).

In traditional medicine, it acts as a counteragent for conditions like liver diseases, asthma, hypertension, arthritis, palpitations, stress, anxiety, depression, nerve pain and epilepsy (Nain J, 2012).

Additionally, it has been shown to exhibit a wide range of pharmacological properties, including strong antibacterial effects, hypoglycemic activity, analgesic effects, anti-inflammatory properties and hypoglycemia, the therapeutic potential of *Elaeocarpus ganitrus* has been attributed to its phytosterols, lipids, alkaloids, flavonoids, carbohydrates, proteins and tannins. The aqueous leaf extract also contains glycosides while the ethanolic leaf extract includes gallic acid, ellagic acid and quercetin (Bhattacharya SK, *et al.*, 1975).

This review aims to outline the scientific basis for the pharmacological and medicinal qualities of *Elaeocarpus ganitrus* Roxb, as well as its therapeutic applications. Rudraksha has been recognized as an important medicine since antiquity. Several traditional texts including Raj nighantu, bhavaprakash nighantu, nighantu adarsha, shankar nighantu, dravyaguna vigyan describe various synonyms for rudraksha (Hule AK, *et al.*, 2011).

## LITERATURE REVIEW

### Botanical description

*Elaeocarpus ganitrus*, commonly known as rudraksha, is a medium-sized tree that grows at altitudes ranging from 3,000 meters above to below sea level. It is found in the Himalayan foothills, Nepal, Sikkim and throughout South and Southeast Asia. The trees typically reach heights of 60 feet to 80 feet. The brown, tubercle seeds have a diameter ranging from 1-2 cm and can be spherical, oblong, or oval in shape (Dasgupta A, *et al.*, 1984; Singh RK, *et al.*, 2000).

Additionally, the seeds are divided into five segments along their longitudinal axis. Rudraksha is an evergreen tree characterized by large leaves. It can grow to heights of 50 feet-200 feet. When exposed to sunlight, the leaves appear large and vivid green; however, when facing downward, they take on a dark and stringy appearance (Singh RK and Nath G, 1999; Bapalal GV, 2007).

### Morphological characters

The morphological characteristics of the plant are summarized below, with macroscopic descriptions provided in Tables 1 and 2.

**Leaves:** Simple, glabrous, sub-entire or irregularly crenate, oblong-lanceolate, acute or acuminate.

**Flowers:** Fringed petals with linear anthers; white or yellow in color; dense racemes typically arising from the axils of fallen leaves; blooms occur in April and May.

**Fruits:** Tiny, round to oval fruits that are tinted violet or blue and have an acidic taste. The endocarp is stony, globular, hard and firmly tuberculate. It is reddish-brown in color and features 4-5 longitudinal ridges, although it may occasionally have 1-4.

Table 1: Macroscopic examination of *Elaeocarpus ganitrus* leaves

| Leaf   | Inspection/Observation               |
|--------|--------------------------------------|
| Apex   | Acute                                |
| Base   | Symmetric                            |
| Color  | Shining green                        |
| Margin | Undulate                             |
| Shape  | Ovate                                |
| Size   | 5-6 inches in length, 2 inches broad |

Table 2: Macroscopic examination of *Elaeocarpus sphaericus* seeds

| Seed    | Inspection/Observation  |
|---------|-------------------------|
| Color   | Blue (On full ripening) |
| Texture | Hard                    |
| Taste   | Sour                    |
| Shape   | Round                   |
| Size    | ½-2 inches              |

### Powder characteristics

The powdered form of *Elaeocarpus ganitrus* appears reddish-brown and contains polygonal lignified stone cells with narrow lumens (Gupta AK, *et al.*, 2008). It also includes thin-walled parenchymatous cells filled with reddish-brown contents, simple to compound starch grains, calcium oxalate rosette crystals, scleroids of various sizes and shapes from the endocarp, endosperm cells filled with aleurone grains and transversally cut cotyledon cells loaded with droplets of oil and aleurone grains (Tripathi Indradev, 2006; Vaidyaratnam PS, 2010).

### Rasa-panchak

Rudraksha is characterized by a madhur (sweet) rasa taste. Its guna (qualities) are sthool (bulky) and snigdha (unctuous). The veerya (potency) can be described as both ushna (hot) and sheeta (cold). The vipak (metabolic characteristic) is also madhur (sweet). The karma (activity) of the medication includes medya (intelligence), hrdayam (cardiotonic) and raksoghna (disinfectant) (Chunekar KC, 2004).

### Types of rudraksha

Rudraksha beads are categorized based on the number of clefts and furrows on their surface, referred to as mukhis. Typically, rudrakshas with 1-14 mukhis are recognized; however, scriptures mention up to 38 mukhis. A single mukhi rudraksha is rare. The most common type is the five-faceted or punchmukhi rudraksha. The effects of each bead vary according to the number of mukhis.

### Some important formulations of *Elaeocarpus ganitrus*

Several formulations derived from *Elaeocarpus ganitrus* include cukkumitppalyadi gutika, svarnamukladi gutika, dhanwantara gutika, gorochanadi vati, mrtasanjivani gutika, rudraksha eyedrops, rudraksha paste, rudraksha churan, rudraksha hima (cold infusion), rudraksha milk, rudraksha decoction for gargling, rudraksha lehyam, rudraksha vibhuti, rudraksha oil and rudraksha bhasma (Ayurvedic Pharmacopoeia Committee (APC), 2001).

### Therapeutic uses of rudraksha

**Enhancing memory power:** Rudraksha is known to enhance memory when consumed with milk. This traditional use highlights its potential benefits for cognitive function.

**Anti-inflammatory properties:** Both methanolic and aqueous extracts of *Elaeocarpus sphaericus* leaves have demonstrated an inhibitory effect on inflammation induced by carrageenan at a concentration of 200 mg/

kg (Sharma PV, 2005; Garg Kalpana, 2013). This anti-inflammatory action may result from the inhibition of prostaglandin synthesis through the suppression of cyclooxygenase enzymes. Additionally, rudraksha may be beneficial in treating chronic conditions such as cancer. It can be applied externally by wearing it or taken orally by consuming boiled rudraksha milk, swallowing fine rudraksha dust mixed with water, or using different mukhi dust for various ailments (Joshi SC and Jain PK, 2014; Sharma PV, 2004).

**Anti-diabetic properties:** The aqueous extract of *Elaeocarpus ganitrus* has shown antidiabetic properties in experimental animals. Studies involving rats have indicated that both the aqueous and chitosan-based extracts of *Elaeocarpus ganitrus* enhance hypoglycemic action, particularly the chitosan-based leaf extract.

**Anti-ulcerogenic activity:** Extracts from the dried fruit and leaves of *Elaeocarpus sphaericus*, when tested in benzene, petroleum ether, acetone, chloroform and ethanol, have demonstrated anti-ulcerogenic properties.

**Anti-asthmatic activity:** *In vivo* studies have shown that the fruits of *Elaeocarpus sphaericus* exhibit anti-asthmatic effects. The extracts from petroleum ether, chloroform, acetone and ethanol have indicated mast cell stabilizing activity, suggesting their effectiveness against bronchial asthma.

**Hepatoprotective activity:** The hepatoprotective potential of *Elaeocarpus ganitrus* extract was evaluated in wistar albino rats with liver damage induced by carbon tetrachloride. The findings clearly demonstrate that *Elaeocarpus ganitrus* has a significant hepatoprotective effect against liver damage caused by carbon tetrachloride (Naresh K, *et al.*, 2013).

**Antioxidant activity:** An ethanolic extract of *Elaeocarpus ganitrus* leaves was evaluated *in vitro* for its total antioxidant capacity, metal chelating ability, reducing power, hydroxyl radical scavenging activity and ABTS<sup>+</sup> (2,2-azino-bis-(3-ethylbenzothiazoline-6-sulfonic acid)) radical scavenging activities. The highest iron chelating activity of 76.70% was observed at a concentration of 500 µg/mL extract (Henry M, *et al.*, 2021). This was followed by ABTS<sup>+</sup> radical scavenging activity 55.77% at the same concentration; however, the extract exhibited a relatively low hydroxyl radical scavenging activity of 13.43%. These results indicate that the ethanolic extract of rudraksha possesses significant antioxidant properties (Liu B, *et al.*, 2007; Indhiramuthu J, 2016).

**Anti-microbial activity:** The extract of rudraksha leaves demonstrated a wide range of antimicrobial activity by inhibiting the growth of various microorganisms, including *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Penicillium* sp. *Aspergillus flavus*, *Candida albicans* and *Candida tropicalis*. The leaves of *Elaeocarpus ganitrus* have been found to produce potent antibacterial compounds (Almeida RN, *et al.*, 2001).

**Anti-hypertensive activity:** *Elaeocarpus ganitrus* has been reported to possess anti-hypertensive activity. The aqueous extract of *Elaeocarpus ganitrus* seed powder was evaluated for its antihypertensive effects in renal artery-occluded hypertensive rats. The elevated blood pressure in these animals was significantly decreased  $p < 0.05$  by the aqueous extract at doses of 25, 50 and 100 mg/kg. The antihypertensive activity of the aqueous extract may be attributed to its action on the renin-angiotensin system (Singh RK, *et al.*, 2000; Anusha JM and Janarthan M, 2014).

**Immunomodulatory nature:** The seeds of *Elaeocarpus ganitrus*, commonly known as rudraksha, were tested for their immunomodulatory potential using methanolic extracts in both *in vitro* and *in vivo* settings. The effects of the extract at various doses 832-6.5 µg/mL on mediator secretion such as nitric oxide, superoxide and lysosomal enzymes were assessed in isolated murine peritoneal macrophages (Luo XD, *et al.*, 2002). The methanolic extract influenced both non-specific (phagocytosis) and specific (cell-mediated and humoral) immune responses. It significantly increased the release of superoxide at 416 and 208 µg/mL, lysosomal en-

zymes at 208 and 104 µg/mL and nitric oxide at 416, 104 and 52 µg/mL (Kumar TS, *et al.*, 2008; Kumar G, *et al.*, 2011).

**Natural prevention technique against harmful mobile phone radiation using rudraksha beads:** Due to the positive electromagnetic properties of rudraksha beads, wearing them as adornments can reduce the harmful effects of mobile phone radiation when they touch the skin.

Further research is needed to demonstrate how these plant beads provide protection against Radio Frequency Electromagnetic Fields (RFEMF) produced by mobile phones (Sakat SS, *et al.*, 2009; Joshi UH, *et al.*, 2012) When worn during yoga and meditation, rudraksha beads have been reported to produce remarkable effects, lowering the wearer's heart rate to below normal levels, similar to well-trained athletes (Hule AK and Juvekar AR, 2010).

**Anti-asthmatic activity:** In the investigation, the fruits of *Elaeocarpus sphaericus* were found to influence autocoid release from mesenteric mast cells in rats. The effectiveness of *Elaeocarpus sphaericus* against bronchial asthma was confirmed by the discovery that ethanol extracts of the fruits exhibited mast cell stabilizing action when tested using petroleum ether, acetone, benzene and chloroform extracts (Tripathy S, *et al.*, 2016; Rao KS, *et al.*, 2012).

**Anti-fungal activity:** *Elaeocarpus ganitrus* possesses notable antifungal properties. Extracts of rudraksha in ethanol and chloroform solvents have demonstrated strong antifungal activity against *Candida albicans*, while other extracts, such as water, ethanol and chloroform, exhibited mild suppression against *Aspergillus niger* (Singh B, *et al.*, 2010).

**Anti-anxiety activity:** The antianxiety properties of Petroleum Ether (PE), Chloroform Extract (CE), Ethanol Extract (EE) and Water Extract (WE) of *Elaeocarpus ganitrus* were evaluated using an elevated plus maze model in mice. The results were compared with diazepam, a commonly used medication. The ethanol extract of *Cordia behen* 200 mg/kg and the chloroform and ethanol extracts of *Elaeocarpus ganitrus* 200 and 400 mg/kg exhibited antianxiety activity comparable to diazepam by significantly increasing the time spent and percentage of open arm entries in the Elevated Plus Maze (EPM) model (Singh B, *et al.*, 2012; Shah G, *et al.*, 2010).

**Anti-depressant activity:** Ethanolic and petroleum ether extracts of *Elaeocarpus sphaericus* fruits reduced swim stress immobility in rats, indicating a potential antidepressant effect. A significant central nervous system depressant effect was observed in pharmacological studies using a 90% ethanolic extract of the fruits of *Elaeocarpus ganitrus*. This effect was characterized by typical behavioral actions, morphine analgesia, anticonvulsant properties, potentiation of hexobarbitone hypnosis and anti-amphetamine effects (Rauniar GP and Sharma M, 2012).

The extract demonstrated cardio depressor and stimulant activities, with some actions mediated by the activation of beta adrenoceptors and others by direct musculotropic activity.

**Cytotoxic activity:** When tested against a panel of human cancer cell lines, the chloroform-soluble bark extract of *Elaeocarpus mastersii* exhibited substantial cytotoxic activity.

Additionally, cucurbitacin D, cucurbitacins and cucurbitacin F isolated from *Elaeocarpus mastersii* showed cytotoxic effects against Krebs II (human oral epidermoid carcinoma) cells. The ethanolic leaf extract of *Elaeocarpus serratus* demonstrated phytotoxic potential against brine shrimp (Kinghorn AD, *et al.*, 2003; Ito A, *et al.*, 2002; Biswas SK, *et al.*, 2012).

## CONCLUSION

Rudraksha, also known as *Elaeocarpus sphaericus*, offers significant spiritual and therapeutic benefits. Various parts of the tree are utilized in different ways; individuals may wear rosaries, bracelets, or necklaces or consume the seeds, fruits, or leaves directly.

Numerous studies have been conducted to assess the efficacy of these traditional practices. The electromagnetic properties of rudraksha are believed to disperse negative energy while promoting confidence and peace of mind. This species is effective against various conditions, including diabetes, asthma, depression, bacterial and fungal infections and stomach disorders. Therefore, further scientific research on the traditional medicinal potential of *Elaeocarpus sphaericus* is warranted, along with appropriate management strategies for its cultivation and production.

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