

A Review On Phytochemical Profile And Pharmacological Activity Of *Elaeocarpus Ganitrus*

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Abstract- *Elaeocarpus ganitrus* is a large evergreen tree native to north asia, known for its medicinal properties. It is believed to provide spiritual illumination to those who wear rudraksha beads. Rudraksha is also used in ayurvedic medicine to manage blood pressure, asthma, mental disorders, diabetes, gynecological disorders, and neurological disorders. The plant's parts, including beads, bark, leaves, and outer shell, are considered for alleviating various health problems. Ayurvedic texts categorize rudraksha fruits as thermogenic, sedative, cough alleviators and are useful for treating bronchitis, neuralgia, cephalgia, anorexia, migraine, manic conditions, and other brain disorders.

Rudraksha is also used in folk medicine as a counter agent for stress, anxiety, depression, palpitation, nerve pain, epilepsy, lack of concentration, asthma, hypertension, arthritis, and liver diseases. The therapeutic potential of rudraksha is largely due to its phytochemicals, including isoelaecarpicine, elaeocarpine isoelaecarpine, quercetin, gallic, ellagic acids, and rudrakine. A study evaluating the phytochemical profile of *elaecarpus ganitrus* and *desmostachya bipinnata* revealed that the extracts were rich in phenolic and flavonoid compounds, with several phytoconstituents responsible for their therapeutic activity. Further scientific experimentation is needed to fully realize the medicinal effect of rudraksha and contribute to a better world.

Keywords: Rudraksha, *Elaeocarpus ganitrus roxb*, Stress, Anxiety, Traditional medication system, Antioxidant activity, Insomnia, Antidepressant, anti-inflammatory, Hypoglycemic, Antiulcerogenic Alkaloids, Flavonoids, Elaeocarpine Isoelaecarpine , Quercetin, Gallic acid, etc.



Fig no.1 *Elaecarpus ganitrus*

INTRODUCTION:

Elaecarpus ganitrus, a member of the *elaecarpaceae* family, is often referred to as rudraksha in india. Family and spreads throughout the himalayan region 1. There are roughly 360 species of *elaecarpus*, which are found in Australia, east asia, Malaysia, and the Pacific islands. This genus contains over 120 species that are found throughout asia, with 25 of those species only occurring in india². Rudraksha beads have immense religious, spiritual, and materialistic importance, according to Hindu mythology. Rudraksha is regarded in hindu mythology as a symbol of the connection between the earth and the sky. It is thought to hold the secrets to the universe's whole evolution inside itself.⁽³⁾

elaecarpus ganitrus roxb. Is an evergreen tree with ripe fruits containing a hard, highly ornamental endocarp known as bead or nut. It holds significant importance in hindu religion and ayurveda, the ancient indian system of medicine. The fruit is worn by hindu mystics as necklaces and in their daily worship for counting prayers. Rudraksha, a dried herbal fruit, is grown in the himalayan region of india for its medicinal



Fig.no.2 Eaeocarpus ganitrus plant & their parts.

properties and attractive fruit stones. It is used in folk medicine to treat various ailments, including stress, anxiety, depression, palpitation, nerve pain, epilepsy, migraine, lack of concentration, asthma, hypertension, arthritis, and liver diseases. According to the ayurvedic medicinal system, wearing rudraksha beads can have a positive effect on Rudraksha seeds are attributed with numerous and heavenly properties and have been traditionally used in india and other asian countries. E. Ganitrus contains quercetin, gallic and ellagic acids, (-) elaeocarpine, (-) iso-elaecarpine, and rudrakine. (10,11) people use the fruit of e. Ganitrus to treat various ailments, such as epilepsy, head and mental illnesses, and small-pox eruptions.(12)

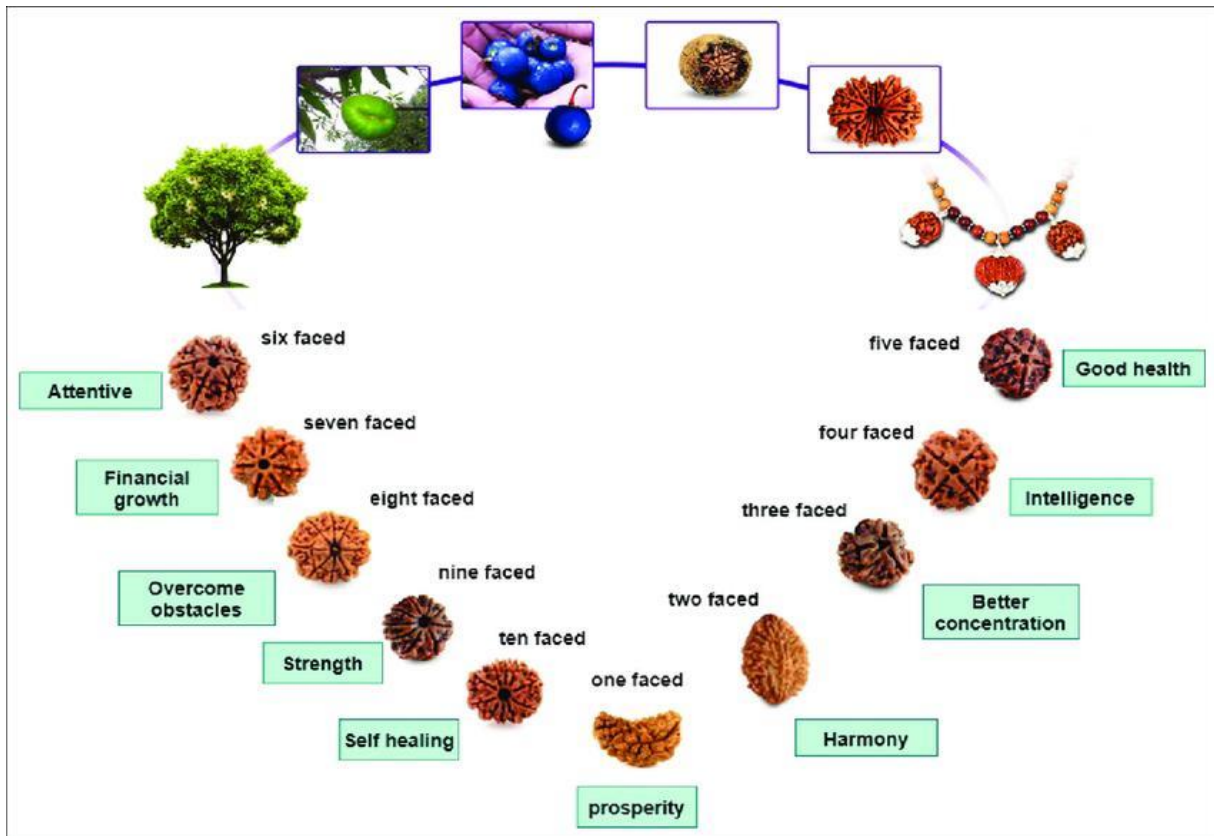


Fig no.3. E. ganitrus Formation.

Biological studies have identified a wide range of pharmacological activities in extracts of e. Ganitrus, including anti-inflammatory, analgesic(13), cns activities, tranquillizing, hypnosis potentiation, sedative, antiasthmatic, hydrocholeretic, antidepressant(14), antidiabetic(15), anticonvulsant(16), antihypertensive, cardioprotective (9), and anti-inflammatory effects.

Rudraksha beads, a type of plant, have numerous electrical properties and are beneficial for various ailments. They are also used to treat skin diseases, pimples, boils, mental diseases, ringworm, and have anti-ageing properties(17). E. Ganitrus, a member of the elaeocarpaceae family, is used to treat various diseases. Elaeocarpus floribundus, a combination of bark, stem, and leaf, is used as a mouth wash and as an antiseptic. Elaeocarpus oblongus fruit is used as an antiseptic¹⁷. Elaeocarpus is also used in treating ulcers, rheumatism, piles, pneumonia, and leprosy. The bark of elaeocarpus parvifolius is particularly effective in treating malarial infections. The bitter and sour juice of

Fig no. 4 Formation of Eaeocarpus ganitrus with special properties.



leaves is used to check sunstroke and treat fevers¹⁸. There is a growing interest in the pharmacological evaluation of various therapies used in indian traditional medicine.

Eaeocarpus ganitrus Vernacular names:

- Sanskrit: *Rudraksha*
- Hindi: *Rudraksha*
- Marathi :*Rudraksha*
- ,Russian: *Rudrakaya*
- Kannada: *Rudrakshi*
- Tamil: *Akkamrudrakai*
- Telugu: *Rudraksha hahu* .

Type mukhi /	Location of action/site of action	Physiological effect
One mukhi	Pineal,pituitary.opticchaisma,hyputhalamus.	Enlightens the super consciousness, improves concentration, and changes the mental structure. Used for heart, blood, and vein diseases.
Two mukhi	Heart	Bestows ‘unity’ on the wearer. Used for acidity and gastric problems, stress and depression, and hysteria.

Three mukhi	Throat,celiac plexus	Used for children with frequent fevers, liver and gallbladder diseases, stress and depression, and blood pressure control.
Four mukhi	Adrenal,heart	Improves memory and intelligence. Used for kidney, thyroid, and brain disorders with psychiatric symptoms, stammering, and memory loss.
Five mukhi	All major chakra points.	Used for liver and gallbladder diseases, as well as blood pressure control
Six mukhi	Prostrate and reproductive organs,root chakras	Protects from the emotional trauma of wordy sorrows and provides learning, wisdom, and knowledge. Used for throat, neck, kidney, sexuality, dropsy, urinary and eye problems, indigestion
Seven mukhi	Optic chiasma,pancreas	Stress and depression treatment
Eight mukhi	Medulla oblongata	It is used to treat insomnia.
Nine mukhi	Pineal pirtuitary	Used for backache/body pain
Ten mukhi	Heart power	Protracted cough
Eleven mukhi	Abstract nerve energy	Used for body pain/backache, cns diseases, pregnant women for uncomplicated delivery, chronic alcoholism
Twelve mukhi	Cerebral hemisphere, hiatus of stomach, Esophagus	Used to treat heart, blood, vein, rickets, and osteoporosis.
Thirteen mukhi	Celiac plexus,prostate	Used to treat muscular dystrophies
Fourteen mukhi	Heart	Used for stress and depression
Fifteen mukhi:	Ileocecal valve,lymphatic throat area system reproductive organs etc.	Used to treat infertility, miscarriage, and abortion.
Sixteen mukhi	Thyroid thymus,spleen ,pancreas	Used to treat thyroid, thymus, spleen, and pancreatic disorders.
Seventeen mukhi:	Small intestine,lungs and bronchial tree	Used to treat small intestine, lung, and bronchial tree disorders.
Eighteen mukhi:	Liver.womb	Used for disorders of liver

Types of *elaecarpus ganitrus*:



Fig no. 5 verious types of *Elaecarpus ganitrus*.

PHYTOCHEMISTRY OF ELAEOCARPUS GANITRUS :

Elaecarpus ganitrus is scientifically classified as in the following manner(19):

Botanical name	<i>Elaecarpus ganitrus</i> (roxb.)
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Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Oxalidales
Family	Elaeocarpaceae
Genus	Elaeocarpus
Species	E. Ganitrus
Common name	Rudraksha
Type	E. Serratus linn, e. Ganitrus roxb, etc.
Habit	Tree

Table no.2

1. Biological distribution:

The three nations where commercial rudraksha is sourced are india, indonesia, and nepal. Seventy-five percent of the rudraksha that is sold internationally is of indonesian origin, twenty percent is indian, and five percent is nepali. Given that their environment is more potent, rudraksha from nepal are hard, small, heavy, and lustrous. They are therefore more costly. These beads are treated with oil and colour to increase their market price. Dried fruit (bead) and leaves of elaeocarpus sphaericus, sometimes called the rudraksha tree, are a few examples. The dirty white, yellow, brownish-black, or reddish-brown e. Sphaericus seeds have a rough, woody texture. The endocarp is firm, tuberculate, globular, and stony. [18]

2. Morphological and macroscopic description:[20, 21, 22, 23, and 24]

The elaeocarpus ganitrus (rudraksha) is a large tree that grows up to 50-200 feet tall and has a diameter of up to 1.23 meters. It has cylindrical leaves with darkish white and uneven texture, and its green crown takes on a pyramidal shape in its natural habitat. The leaves are similar to indian mango leaves, measuring nearly 18 cm in length and varying in width from 2.65 cm to 4.55 cm. They have a deep green upper side and a leathery pattern on the dorsal side.

The rudraksha plant produces white or yellowish-white flowers in april-may, with dense racemes and linear anthers. These flowers emit a soft sweat aroma or smell and appear in bunches but are smaller than the leaf. The fruits are bulbous in shape with fatty acid in the outer part, with circular, elliptical, or oval shapes, violet or blue, and an acidic pulp. The fruit endocarp is a stony, hard, globular, strong tubercle.

The seeds of the rudraksha are dark bluish color fruits that can be soaked in water for a few days to remove their outer covering and obtain a hard stony source. The seeds are hard and woody on the surface, with light chocolate color juice enclosed within the berry pulp. The seed price varies based on the number of perpendicular lines running down on its exterior, forming the 'mukhs' or rudraksha faces.

The rudraksha tree matures after seven years and continues to produce fruits for a long time after seven years. The morphological characteristics of the plant include simple, glabrous, oblong-lanceolate, acute or acuminate, sub-entire or irregularly crenate leaves, white or yellow flowers, tiny, round, oval, violet or blue fruits, and a reddish-brown endocarp.

Macroscopically examination of leaf (24):

- Apex : acute
- Base: symmetric
- Color : shining green
- Margin: undulate
- Shape : ovate
- Size: 5-6 inch in length, 2 inch broad.

Macroscopically examination of seed (25):

- Blue (when completely ripened) in colour
- Firm texture
- Sour flavour

- Round, bulbous shape 5 ½-1 inch size.

3. Cultivation and collection of *Elaeocarpus ganitrus* (26):

Elaeocarpus ganitrus is a sacred tree that grows up to 2000 meters above sea level and prefers a slightly warm, moist climate for germination. It is considered a very sacred tree and can be found in various environments such as moist gullies, stony ridges, and grimy coastal areas. The normal re-growth of rudraksha is slow due to its hard seed coat, taking almost two years to develop on the soil's dampness.

Rudraksha trees begin bearing fruits after 3-4 years and continue producing fruit until its survives. In nepal, the manor of trees cultivated on homestead lands is both for its business esteem and for improving soil richness. Rudraksha is a rapidly developing plant category and has been incorporated under the social park ranger service program of arunachal pradesh. tissue culture is generally used in nursery for germinating rudraksha plants. Scientific techniques for testing actual *elaecarpus ganitrus* seeds are difficult and valuable. The most proportion of rudraksha produce from e. *Ganitrus* plant are five faces, but prices increase if no look raises on the surface or more than ten or only one face grove on its surface. Due to growing demand, imitation of replica rudraksha beads are also available in the marketplace, which requires routine tests to recognize its originality.

4. Scientific method for evaluating real *elaecarpus gingnutus* seeds (rudraksha)(27)

To test the actual *elaecarpus ganitrus* seed (rudraksha), several scientific techniques are used. These include

- properties tests,
- Cut tests,
- Eye tests,
- Copper coin tests,
- X-ray tests,
- Water tests,
- Ct scanning.

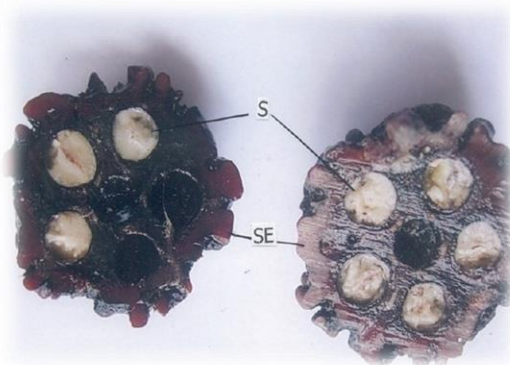
properties tests determine if the seeds show properties similar to capacitance, inductance, conduction of electricity, and electromagnetic resonance. Cut tests are considered reliable but can spoil the seed permanently. Eye tests reveal deep linings on the seed, while copper coin tests show movement due to electrical and magnetic properties. X-ray tests provide 100% precise results for rudraksha up to nine mukhi, but may not give 100% accurate results for rudraksha with more than 10 mukhi. Water tests reveal rare and precious rudraksha seeds, while ct scanning is more complex and costly.

Chemical composition(28) :

Rudraksha beads are a plant product that contains carbon, hydrogen, nitrogen, oxygen, and trace elements in combination. Composition of gaseous elements in rudraksha beads as a percentage:carbon (50.031%),nitrogen content is 0.95%.hydrogen makes up 17.897% of the total.oxygen content is 30.53%.

Active constituents :

Fig no.5 *elaecarpus ganitrus* seed



Phytoconstituents found in *elaecarpus ganitrus* fruit include alkaloids, flavonoids, tannins, carbohydrates, and cardiac glycosides, triterpenoids, and steroids. Includes a sizable quantity of phytocomponents as well, including quercetin, gallic, ellagic acids, rudrakine, and isoelaecarpicine, elaeocarpine, and isoelaecarpine.

Phytochemicals' chemical structures are shown: [4]

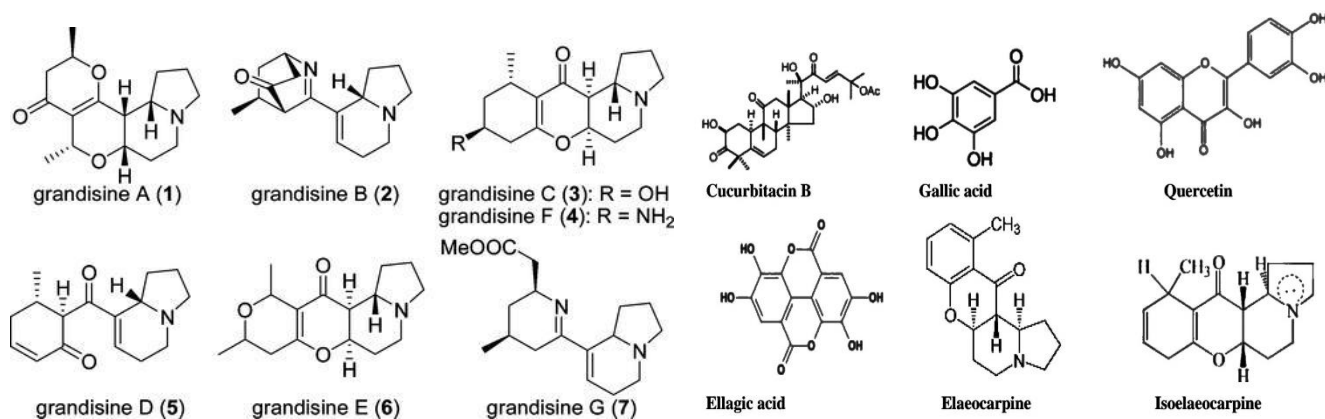


Fig no.6 phytoconstituents of elaeocarpus ganitrus

Elaeocarpus ganitrus Ayurvedic Properties: (37, 38)

1	Improving memory power	Improving memory power. When taken with milk, <i>Elaeocarpus ganitrus</i> has been demonstrated to improve memory.
2	For all brain diseases	<i>Elaeocarpus ganitrus</i> is useful in the treatment of all brain disorders, including cerebral fever.
3	As a blood purifier	<i>Elaeocarpus ganitrus</i> is used to purify the blood and strengthen the body.
4	Antibacterial	<i>Elaeocarpus ganitrus</i> can be used to cure burns and marks. It can also treat coughs and respiratory issues.
5	Blood pressure	<i>Elaeocarpus ganitrus</i> can help treat high blood pressure and cardiac disease.
6	Curing liver related problems, jaundice, and Stomachache	<i>Elaeocarpus ganitrus</i> is effective for healing stomach pain and liver issues.
7	Cosmetic product	Used to enhance skin tone and create an attractive appearance.

Table no. 3 E.Ganitrus Ayurvedic Properties

Therapeutic Benefits & Medicinal Uses Of Elaeocarpus Ganitrus (Rudraksha):

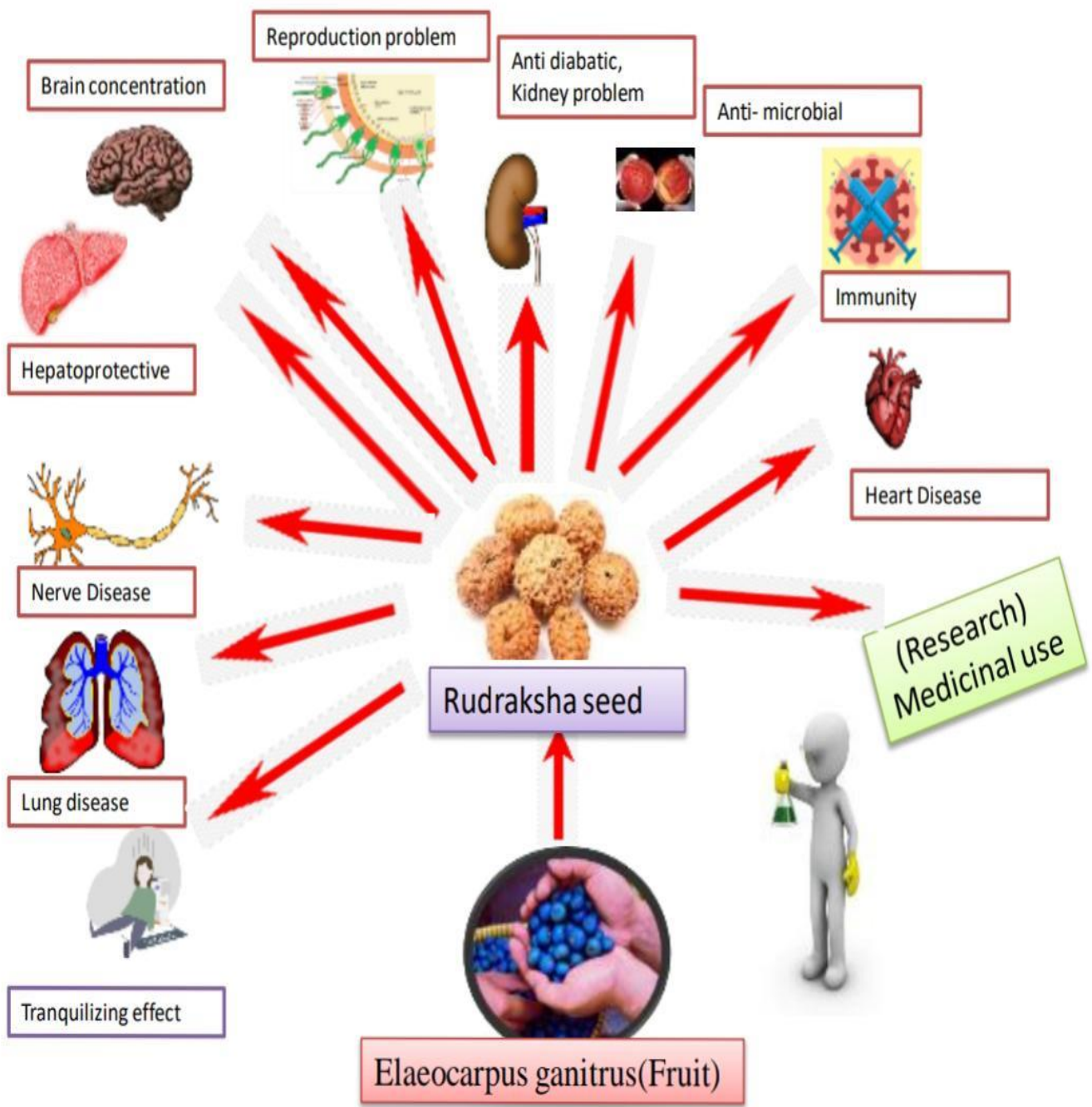


Fig no. 7 Application of elaeocarpus ganitrus

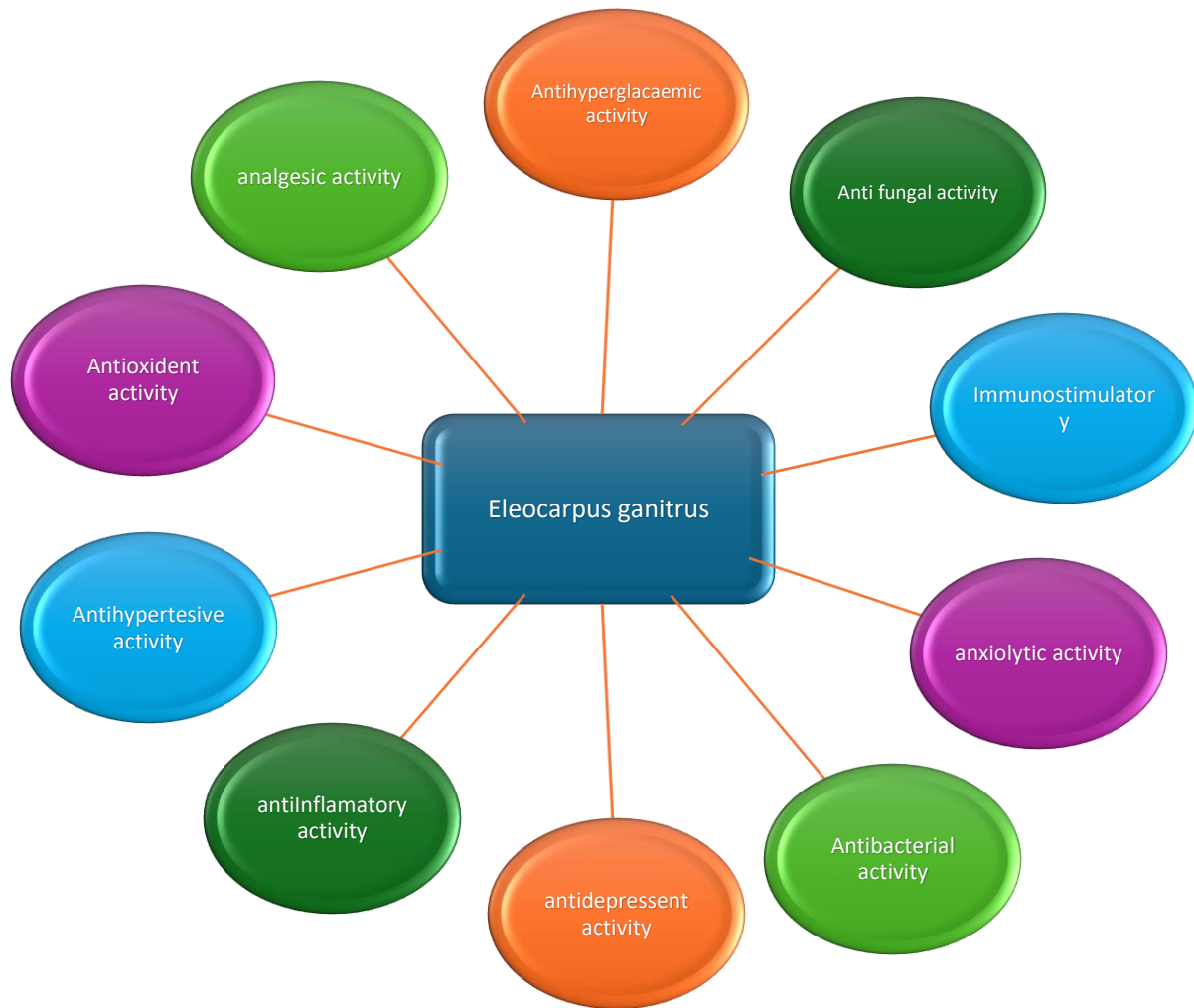


Fig no. 8 Therapeutic Benefits & Medicinal Uses Of Eleocarpus Ganitrus.

1. Antiasthmatic activity:

Singh discovered that extracts of *elaecarpus sphaericus* fruits, including chloroform, acetone, petroleum ether, benzene, and ethanol, can stabilise mast cells. *Elaecarpus sphaericus* has demonstrated efficiency in treating bronchial asthma. Another study found that extracts of petroleum ether, benzene, chloroform, acetone, and ethanol protected guinea pigs from bronchospasm caused by cholinergic aerosols and histamine.⁴³

2. Antimicrobial activity:

Singh's study examined the dried fruit of *elaecarpus sphaericus* extracted in petroleum ether, benzene, chloroform, acetone, and ethanol. Using the plate dilution and disc diffusion procedures against 28 gram-positive and gram-negative bacteria. Against ten different species, the acetone fraction exhibited strong antibacterial activity. Ethanol extracts were effective against *Plesiomonas shigelloides*, *Shigella flexnerii*, and *Sh. Sonnei*¹¹, and benzene extracts against *Morganella morganii* and *Salmonella typhimurium*. *Elaecarpus serratus* leaf extract, according to Shazid, had antibacterial efficacy against *Salmonella typhi*, *Plesiomonas*, and *Proteus* spp.⁵¹

3. Restlessness & body ache in fever :-

Rudraksha, a remedy used to alleviate restlessness and body ache in fever, has immunostimulatory effects and can help fight infections. Consuming 1 to 3 grams of rudraksha churna with shadanga paniya or warm water can reduce fatigue, body pain, and burning sensations due to high fever.

4. Antioxidants Activity :-

According to Kumar, there was a favourable relationship between total phenolic content and antioxidant capacity in the outcomes of the *E. Ganitrus* ethanolic leaf extracts. The ethanolic leaf extracts of *E. Sphaericus* shown several antioxidant properties such as metal chelating, total antioxidant capacity, reducing power, hydroxyl radical scavenging, and ABTS (2, 2-azino-bis-3-benzothiazoline-6-sulphonate) radical scavenging. The extract's maximal iron chelating activity (76.70%) at 500 µg/ml concentration was followed by its maximum ABTS⁺ radical scavenging activity (55.77%) at the same concentration, according to the results. Nevertheless, only limited hydroxyl radical scavenging activity (13.43%) was demonstrated by the extract. At 500 µg/ml extract concentration, the total antioxidant capacity was determined to be 24.18 mg ascorbic acid equivalents³⁴.

5. Wound healing activity:-

The rate of wound healing was statistically significantly accelerated ($p < 0.001$) and the time it took for epithelization to occur was shortened in rats with excision wounds when they were topically administered an ointment base containing an ethanolic extract of *elaecarpus ganitrus*. When *elaecarpus ganitrus* leaf extract was applied topically, the control group's epithelization duration was shortened from 28 days to 16 days. Animal experiments have demonstrated that leaf ethanolic extract can both significantly narrow wounds and promote healing. We therefore draw the conclusion that creating an ointment using leaf extract from *elaecarpus ganitrus* will be successful in bringing wound-healing medications to market. [6]

6. Activity related to tuberculosis:-

Although modern medicine has better therapies for tuberculosis, traditional medicine advised the following rudraksha mixture. This medication was given to patients who had tuberculosis. It can now be used as supportive therapy in situations of multidrug-resistant tb. Alongside vasant mali rasa and swarna bhasma. For strength and lung protection, the maximum dosage of vamshalochan must be added.

7. Anti-diabetic activity:-

The dosages of 40 mg/kg and 75 mg/kg caused a substantial response in the diabetic rats. Good result, and five hours after the injection, methanolic extract showed a notable impact. The effects of glibenclamide were noticeable three hours after delivery. The extract was injected twice a day for three days, lowering blood and urine glucose levels in diabetic rats. The extract significantly ($p < 0.05$) reduced the blood glucose-lowering effects at 40 mg/kg and 75 mg/kg by 60% ($p < 0.001$) and 42.8%, respectively, in comparison to insulin's 27% blood glucose-lowering effect. Beta cells that secrete insulin in the pancreas are specifically killed by streptozotocin, leaving behind less active cells. And contributing to diabetes. [9]

8. Anti cancer activity:-

Rudraksha bark contains ellagic acid and cucurbitacin, which have been found to have cytotoxic effects against cancer cells. *Elaecarpus ganitrus* leaves, bark, and fruits have been studied for potential anticancer medication. Cucurbitacins and ellagic acid inhibit nitric oxide synthase, kirsten rat sarcoma viral oncogene homolog, tumor protein p53, and mut l homolog 1 more effectively than nos2, mut s homolog 2, and rac serine/threonine-protein kinase.

9. Analgesic and anti-inflammatory properties :-

The study investigated the analgesic and anti-inflammatory properties of ganitri leaf extract on mice. The mice were divided into five treatment groups, including a negative control group, a positive control group, and an extract group. The pain inducer was 1% acetic acid. The results showed that the ganitri leaf extract had significant analgesic effects on mice, particularly at a dose of 400 mg/kg bw. The extract of *e. Sphaericus* leaves was used to inhibit carrageenan-induced inflammation at 200 mg/kg. This was achieved through cyclooxygenase inhibition, preventing prostaglandin formation. The study also used sodium diclofenac as a positive control. The results suggest that ganitri leaf extract may have potential as an analgesic and anti-inflammatory agent.

10. Antidepressant activity:-

The study investigates the antidepressant activity of *elaecarpus* fruit alcohol extract on dopamine and serotonin levels in mice. The extract was administered at different doses, with low doses decreasing immobility and increasing active behaviors, while high doses reduced immobility and climbing.

11. Immuno-modulatory activity:-

Wearers of group-2 rudraksha beads had better health than those of group-1 rudraksha bead non-users, based on the pathological experiment previously indicated. The group 2 participants' blood cbc and urine pathology data verify that rudraksha beads have definitely some favourable electromagnetic characteristics, piezoelectric effects, or acupuncture, all of which have positive impacts on the metabolism of the human body but still need more research. The results of this pathological experiment demonstrate the potential anti-aging and immune-modulating properties of the electromagnetic rudraksha bead. [16]

12. Acne & pimples:-

Rudraksha churna and arjuna twak churna, mixed in equal proportions, are used in ayurveda to treat acne and pimples. A thin paste is prepared by mixing the mixture with honey and applied to the affected areas or face. This remedy provides a glowing effect, reduces acne, and prevents recurrence. Rudraksha powder can also be mixed with lemon juice for a skin glow and freshness.

13. Chicken pox:-

It helps lessen the intensity of the illness's symptoms.

It lessens headaches, fatigue, and malaise. it also gets less

Pain and burning feeling on chicken pox rashes. It avoids complications and expedites the healing process.

14. Other properties :

Elaecarpus ganitrus ethanolic fruit extract has sedative, anticonvulsive, hypnotic, tranquillizing, and characteristics that prevent epilepsy¹⁴. *Elaecarpus floribundus* fruits and their bark, leaves, and stems have all been used as

mouthwash and antiseptics, respectively⁵⁵. Grandisine a and isoelaecarpiline molecules, together with the opioid receptor, are the analgesic effects of elaeocarpus grandis indolizidine alkaloids⁽⁵⁶⁾.

Formulations of elaeocarpus ganitrus (rudraksha) [8,13] :

- Dhanwantharam gulika
- Chukkumtippalyadi gulika
- GoroChanadi gulika
- Mritasanjeevani gulika
- Suwarnamuktaadi gulika
- Rudraksha churna
- Rudraksha hima
- Rudraksha lehyam
- Rudraksha vibhuti
- Rudraksha tailam

Benefits of rudraksha:-

- Provides strength to the body.
- Reduces headache & beneficial in mental disorders.
- Acts as blood purifier.
- Possess anti ageing property
- Immuno-stimulatory property.
- Good for women's who suffering from hysteria and coma.
- Adjuvant therapy in breathing disorders & chronic cough.
- Anti hypertensive & cardio protective.
- In liver disorders & abdominal disorders.
- Rudraksha powder which is used as paste with rose water increases skin glow.
- Fruit/ bark :good remedy for controlling epilepsy.
- To cure small pox equal quantity of black pepper & Rudrakshapowdered and taken with water.
- Rudraksha bhasma

CONCLUSION:

Elaeocarpus species have been used in Ayurvedic medicine for centuries, but further review is needed to confirm their effectiveness. The Rudraksha plant, traditionally used to treat various ailments, has been found to have pharmacological properties such as antibacterial, antifungal, antidepressant, anticancer, anti-asthmatic, analgesic, and hypertensive properties. It may also have synergistic effects with other drugs or therapies, increasing their effectiveness when used in combination. Further clinical research is needed to confirm the effectiveness of these plants in Ayurvedic medicine. The main goal is to provide a complete review of the topic while also documenting the natural repercussions. This review could be beneficial for future study.

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