

## Mythological and Spiritual Review on *Elaeocarpus Ganitrus* and Assessment of Scientific Facts for its Medicinal Uses

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### ABSTRACT

*Elaeocarpus ganitrus* (Syn: *E. sphaericus*) is the king of herbal medicines which belongs to family *Elaeocarpaceae*. It is commonly known as Rudraksha and is popularly used in Ayurveda, Siddha and Unani system of medicine. It is a large evergreen tree which is found in himalyan region and also in area of gangetic plain. The plant reaches the height of 50-200 feet. The main trunk of tree is rough textured, cylindrical and grayish-white in colour. The leaves are shining, green, oblong, lanceolate, acute or acuminate, minutely crenate or serrate and almost glabrous in nature. The inflorescence is mainly racemes and mostly from the axils of fallen leaves. Fully ripe fruits are blue in color which bears seeds in it and so they are also known as blueberry beads. The seeds are hard and contain tubercles. Traditionally rudraksha is used in the treatment of hypertension, anxiety, epilepsy, migraine, depression, palpitation, nerve pain, asthma, arthritis and liver disease. In ayurvedic medicinal system, wearing of Rudraksha can have a positive effect on heart and nerves. Even the research has proved the powers of rudraksha scientifically with reproducible results which further proved the Rudraksha have dielectric, inductive, diamagnetic, para-magnetic, and dynamic polarity or the ability to change its polarity. The effective constituents are various alkaloids like elaeocarpidine, (+) - elaeocarpine, isoelaecarpine, rudrakine, pseudo epiisoelaecarpiline and flavonoids like quercetin. The present review is an effort to compile all the relevant information and to enlighten the need of research of this plant.

**Key Words:** Rudraksha, *Elaeocarpus ganitrus*, *Elaeocarpus sphaericus*, Magnetic property, Elaeocarpine.

## INTRODUCTION

*Elaeocarpus ganitrus* (Syn: *E.sphaericus*) i.e. Rudraksha is also known as holy tree as it is the beloved tree of Lord Shiva. It is described in various ancient literatures like Shiv puran, Devi Bhagwat Puran, Padma puran. [1] The mythology states about the plant that the three demons, Tripurasuras were having innumerable powers. They lived in Purams which was built in the sky and revolved around the space. The Purams were protected by a boon from Lord Ganesh that nobody can harm them, unless they come into a single axis. That moment comes only once in every thousand years. Prayed by all gods, Lord Shiva decided to kill those demons. Lord Shiva did tapasya (meditation) with half-closed eye (Ardha nimeelita netra). He opened his eyes, concentrated on the axis and burnt Tripurams. Due to the stress caused by tapasya, tears came out his eyes

while opening them and they turned into rudraksha. [2] The seeds of rudraksha were traditionally worn by people for the cure of various disorders like the wearer gains health and peace, it also increases memory etc. Various researches have been done to prove its activities like hypertension, anti-inflammatory, analgesic, anti-microbial etc.

However, the present review deals with the uses of rudraksha, the advancement in pharmacological and phytochemical evaluations which will be remarkable for the exploitation for new components and fully utilization of this plant. The possible development and perspective for future researches of the plant are also discussed.

Rudraksha is a well known drug since ancient times. Its different synonyms listed in **Table 1** are mentioned in classical books like Raj Nighantu, Bhavaprakash Nighantu, Nighantu Adarsha, Shankar Nighantu, Dravyaguna Vigyan etc. [3-9]

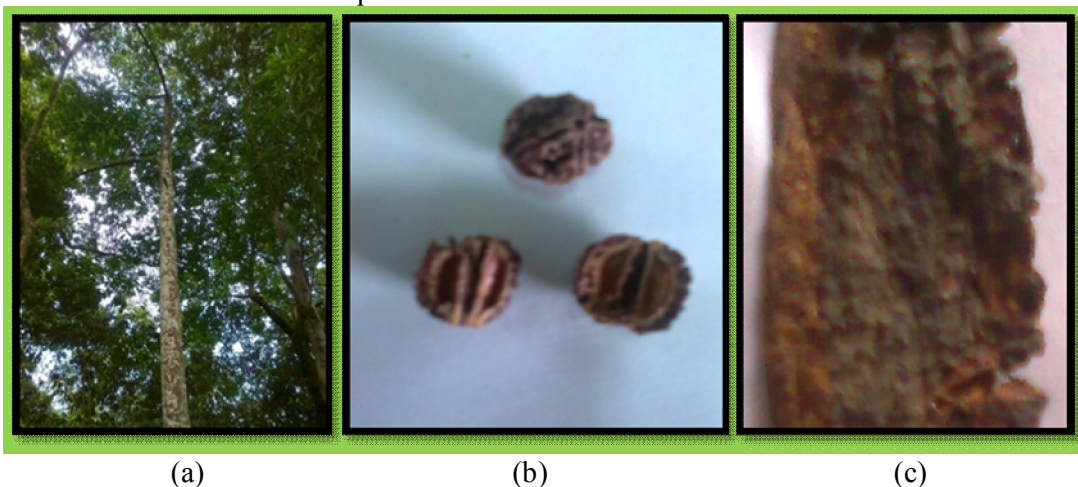
**TABLE 1: SYNONYM OF RUDRAKSHA**

Language	Synonyms
Sanskrit	Chattu sampangi, Rudraksha, Bhutnasan
Hindi	Rudraki, Rudraksha
English	Utrasum Bead Tree , Wooden Begger bead
Gujarati	Rudraksh
Bengali	Rudrakya
Kannada	Rudrakshi mara, Rudraksh
Malayalam	Rudraksha, Rudraksam
Marathi	Rudraksha
Punjabi	Rudraksha
Tamil	Rudraksha, Ruttiratcam
Telgu	Rudraksha, Rudraksi
Assam	Rudrai, Ludrok, Udrok
Other	Sivaksha, Sarwaksh, Paawan, Nilkanthaksha, Haraksha, Sivpriye

### 1.1 Botanical classification

*Elaeocarpus ganitrus* belongs to genus *Elaeocarpus*, family Elaeocarpaceae. It is a plant from kingdom Plantae, division Magnoliophyta, Magnoliopsida class and order Oxilidales. The *Elaeocarpus* consists

of about 12 genera and 350 species of trees and shrubs and are distributed in the tropical and subtropical regions but mainly it has about 36 sister species including rudraksha.<sup>[10]</sup>



**FIGURE 1: PHOTOGRAPHS OF *Elaeocarpus ganitrus* SHOWING (A) TREE, (B) SEEDS, (C) BARK**

### 1.2 Description

The morphological and microscopical characters of plant are listed in **Table 2**<sup>[3, 8, 10]</sup> and **Table 3**<sup>[6, 11]</sup> respectively.

**TABLE 2: MORPHOLOGY OF DIFFERENT PARTS**

Parts	Morphological characters
Leaves	Simple, oblong-lanceolate, sub-entire or irregularly crenate, glabrous, acute or acuminate
Flower	White colored, in dense racemes and mostly from axils of fallen leaves, fringed petals, anthers are linear, appear in april-may.
Fruits	Small, round or oval, violet or blue colored and acidic in taste.
Endocarp	Stony endocarp is hard, globular, strongly tubercule, marked with 5 to longitudinal ridges, rarely 1 to 4, reddish brown in color.

**TABLE 3: MICROSCOPY OF DIFFERENT PARTS**

Parts	Microscopical characters
Leaves	Single layered epidermis, compactly arranged parenchyma cells covered externally with a cuticle, palisade cells made up of two layers of elongated cells, compactly arranged chlorenchyma cells, prisms of calcium oxalates in midrib cells, conjoint, collateral and closed vascular bundles.
Seeds	Outer layers shows 2 to 3 compact rows of tangentially elongated testa filled with brown pigment, hypodermis composed of radially elongated 1 to 2 rows

	of cells, aleurone grains, and fixed oil and rosette crystals of calcium oxalate.
Endocarp	Several layers of characteristically arranged large islands of thick walled sclerenchyma.

### 1.2.1 Powder characteristics

Powders were reddish brown in color, shows polygonal lignified with narrow lumened stone cells, thin walled, parenchymatous cells with reddish brown contents, simple to compound starch grain,

rosette crystals of calcium oxalate, scleroids of various sizes and shapes from the endocarp, cells of endosperm is filled with aleurone grains, transversally cut cotyledon cells loaded with aleurone grains and oil drops. [5, 6]

### 1.3 Habitat

*Elaeocarpus ganitrus* is a medium sized evergreen tree with a spreading handsome crown, found in tropical and subtropical areas at the attitude ranging from sea coast to 2,000 meters above the sea level. In India it is found in Bihar, Bengal, Assam, Maharashtra, Sikkim, and Madhya Pradesh. [3, 8]

### 1.4 Parts used

The medicinally important part of rudraksha are fruits and seeds kernel. [3, 7, 8]

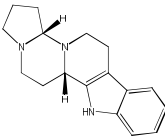
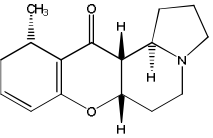
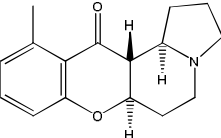
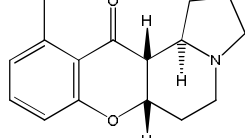
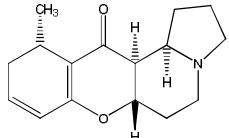
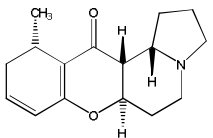
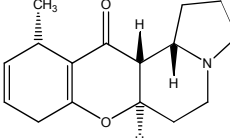
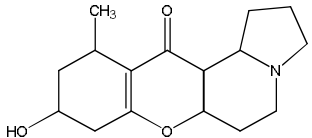
### 1.5 Therapeutic dose

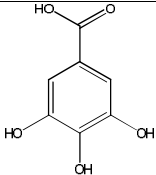
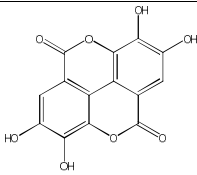
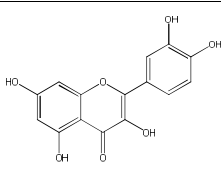
The powder of the drug is given in the dose of 1 to 2 gm. [5, 6]

### 1.6 Chemical composition

Rudraksha is a plant product which contains carbon (50.024), hydrogen (17.798), oxygen (30.453), nitrogen (0.9461) and different trace element in a combined form. The major chemicals which are present in it are palmitic acid and stearic acid. The others chemicals are oleic, linoleic, myristic, isopalmitic, isostearic, lauric, tetradecanoic, palmitoleic and 9-octadecanoic acids. The leaves have shown the presence of various alkaloid, tannin and flavanoid. **Table 4** consists of the constituents with their structures. [6, 10, 12, 13]

**TABLE 4: STRUCTURE OF CHEMICAL CONSTITUENTS**

Alkaloid			
			
Elaeocarpine	(+)- Epielaecarpiline	(+)-Elaeocarpine	(+)- Isoelaecarpine
			
(+)- Epialloelaecarpiline	(-)- Alloelaecarpiline	(+)-Pseudo epiisoelaecarpiline	Rudrakine
Tannins		Flavonoids	

		
Gallic acid	Ellagic acid	Quercetin

### 1.7 Identity, Purity and Strength

The Rudraksha should have foreign matter as nil, total ash should not be more than 1.2%, acid-insoluble ash should not be more than 0.4 % , alcohol soluble extractive value should not be more than 2% and water soluble extractive value should not be more than 1%.<sup>[5]</sup>

### 1.8 Rasa-Panchak

The rasa (taste) of Rudraksha is madhur (sweet). Its guna (properties) is snigdha (unctuous) and sthool (bulky). The veerya (potency) is mentioned as ushna (hot) as well as sheeta (cold). The vipak (metabolic property) is madhur (sweet). The karma (action) of the drug is raksoghna (disinfectant), medya (intelligence), hrdayam (cardio tonic).<sup>[3, 5, 7, 14]</sup>

### 1.9 Important Formulations

GoroChanadi vati, Cukkumitppalyadi gutika, Dhanwantara gutika, Svarnamukladi gutika, Mrtasanjivani gutika.<sup>[5]</sup>

### 1.10 Traditional Uses of Rudraksha

The uses are also described as follows:  
 ‘‘ Rudraksasya phalasthi syanmadhuram  
 sitalam laghu  
 Manovikarasamanam raktabharpaham  
 saram  
 Dahajavaraprasmanam sasyate vatapaittike  
 Apasmare tathonmade raktabhare dhike  
 trsi  
 Masurikayam visophote svase  
 yakridgadesu ca’’

Rudraksha is used since ancient time in the management of various diseases. It is used in vatapaittik disease, dahashaman (burning sensation) by rubbing it like sandalwood, swasroga (bronchial antispasmodic), jwar (fever) cure irritation due to jwar, apasmar (epilepsy), matisudhikara (cure mental condition), manasroga (mental disorder).

It is used to cure chicken pox, mental disorder, insomnia, diseases related to head, to bring peace to the mind, increase the secretion of pitta in case of jaundice and other liver oriented disorder. For hypertension it is best medicine.<sup>[3, 5, 7-9]</sup>

The astrological uses of Rudraksha and its indication with reference to its mukhis are mentioned in **Table 5**.<sup>[3, 10, 11, 15-18]</sup>

### 1.11 Types of Rudraksha with its Astrological uses

The origin of Rudraksha is tear drops fallen from the eyes of Rudra (Lord Shiva). Three eyes of Rudra represent sun, moon and fire. Rudraksha seeds born out of tears of solar eye of Rudra are brown in color and are of 12 types. Those seeds which are born of his lunar eye are fair and are of 16 types. The furious eye tears gave origin to black Rudraksha which are of 10 types. In this way, ancient scriptures mention 38 types of Rudraksha. Traditionally, Rudraksha seeds are categorized on the basis of clefts or faces or mukhas the seeds bears. Two mukhi to fourteen mukhi Rudraksha are commonly available in the market. One mukhi and fifteen to twenty one mukhi Rudraksha are

rare and costly varieties. Three more varieties named Ganesh Rudraksha, Gauri Shankar Rudraksha and Garbh–Gauri Rudraksha are also available in the market scientifically. The ancient scriptures

classify and tag the quality and importance to different mukhi seeds according to the number or type of mukha (faces) the seed has. <sup>[16, 18]</sup>

**TABLE 5: TYPE OF RUDRAKSHA WITH ITS ASTROLOGICAL USES AND INDICATIONS**

Type of Mukhi/ Ruling God	Planet/ Zodiac sign	Shape	Beej mantra	Indications	Astrological uses
1 Mukhi/ Shiva	Sun/ Leo	Half moon shape	Om Namaha Shivaya Om Hreem Namah	Chronic asthma heart problems, mental anxiety, T.B, Paralysis, stroke, eye problem bone pain and headache	Enlightens the super consciousness, provides improved concentration and mental structure changes specific to renunciation form worldly affairs. The wearer enjoys all comforts at his command but still remains unattached
2 Mukhi/ Ardhnar-eshwar	Moon/ Cancer, Scorpio	Two natural lines or facets on its surface	Om Shiva Shaktihi Namah	Impotency, renal failure, stress, anxiety, lack of concentration, depression, negative thinking, eye problems, mental chaos, hysteria and intestinal disorder	Blesses the wearer with 'UNITY'. It could be related to guru-shishya, parents-children, husband-wife or friends. Maintaining oneness is its peculiarity
3 Mukhi/ Agni	Mars/ Aries, Cancer, Leo, Pisces	Three natural lines or mukhas on its surface	Om Kleem Namah	Depression, schizophrenia, weakness multifarious, directive of the menstrual cycle/menstrual stress, fixation or guilt induced	The wearer gets free from sins or wrongs from his life and returns to purity. Ideal for those who suffer from inferior complexes, subjective fear, guilt and depression



				complexes, blood pressure, mood swings, fever or weakness, jaundice and mental disability	
4 Mukhi/ Brahma	Mercury/ Gemini, Virgo	Four lines on its surface	Om Hreem Namah	Blood circulation, cough and brain linked illness, asthma, memory lapse and respiratory problems	The wearer gains power of creativity when blessed. Increases memory power and intelligence
5 Mukhi/ Kalaagni	Jupiter/ Aries, Scorpio, Pisces	Five natural lines (mukhas) on its surface	Om Hreem Namah	Blood pressure, heart problems, stress, mental disability, fatness, anger management, diabetics, piles, neurotic and maladjustment problems	Wearer gains health and peace. It increases memory also
6 Mukhi/ Kartikey	Venus/ Taurus, Gemini, Virgo, Libra, Capricorn, Aquarius	Six natural lines (mukhas) on its surface	Om Hreem Hum Namah	Epilepsy and gynecological problems	Saves from the emotional trauma of worldly sorrows and gives learning, wisdom and knowledge. Affects understanding and appreciation of love, sexual pleasure, music and personal relationships
7 Mukhi/ Maha- laxami	Saturn/ Taurus, Libra, Capricorn, Aquarius	Seven natural lines (mukhas) on its surface	Om Hum Namah	Asthma, pharyngitis, impotency, foot related disease, respiratory and confusion	It should be worn by those who are suffering from miseries pertaining to body, finance and mental set-up. By wearing this man can progress in business and service

					and spends his life happily
8 Mukhi/ Ganesha	Rahu/ -	Eight natural lines (mukhas) on its surface	Om Ganesha -ya Namah	Stomach ache, stress, skin diseases and anxiety	Removes all obstacles and brings success in all undertakings. It gives the wearer all kinds of attainments - Riddhies and Siddhies. His opponents are finished i.e. the minds or intentions of his opponents are changed
9 Mukhi/ Durga	Ketu/ -	9 natural lines (mukhas) on its surface	Om Hreem Hum Namah	Work as mysterious medicine for treating strange diseases	Wearer is blessed with lot of energy, powers, Dynamism and fearlessness, which are useful to live a life of success
10 Mukhi/ Vishnu	None/ -	10 natural lines (mukhas) on its surface	Om Hreem Namah	Hormonal inequality in the body, mental insecurity and whooping cough	This contains the influence of ten incarnations and the ten directions. It works like a shield on one's body and drives evils away
11 Mukhi/ Hanuman	None/ -	11 natural lines (mukhas) on its surface	Om Hreem Hum Namah	Body pain, backache, chronic alcoholism and liver diseases	Blesses wearer with wisdom, right judgment, powerful vocabulary, adventurous life, fearlessness and success. Above all, it also protects from accidental death. It also helps in Meditation and removes the problems of yogic practices
12 Mukhi/ Sun	Sun/ Leo, Sagittarius	12 natural lines (mukhas) on its surface	Aum Kraum Sraum Raum	Bone diseases, rickets, osteoporosis, mental	Wearer gets the quality of the sun - to rule and to move continuously with



		surface	Namah	disability and anxiety	brilliant radiance and strength. Good for ministers, politicians, administrators, businessmen and executives. Removes worry, suspicion and fear. Increases self image and motivation
13 Mukhi/ Indra	Venus/ Taurus, Gemini, Capricorn, Aquarius	13 natural lines (mukhas) on its surface	Om Hreem Namah	Muscular dystrophies	Showers all possible comforts of life one can ever desire. It gives riches and honor and fulfills all the earthly desires and gives eight accomplishments (Siddhies), and the god cupid (Kamadeva) pleases with the man who wears it.. It is helpful for meditation and spiritual and materialistic attainments
14 Mukhi/ Hanuman	None/ Taurus, Gemini, Capricorn, Aquarius	14 natural lines (mukhas) on its surface	Om Shivaya Namah	Brain related and many other types of disease	Most precious divine gem - Deva Mani. It awakens the sixth sense organ by which the wearer foresees the future happenings. Its wearer never fails in his decisions. Its wearer gets rid of all the calamities, miseries, worries. It protects from ghosts, evil spirits and black magic. It provides the wearer safety, security and riches

					and self power
15 Mukhi/ Pashupati -nath	Rahu/ -	15 natural lines (mukhas) on its surface	Om Pashupataya Namah	Skin diseases, recurring miscarriage and still birth. It is measured as a blessing for women who are incapable to imagine and in such case both the partner should wear it for fruitfulness	This represents Lord Pashupati and is especially beneficial for economic progress. Its possessor is neither bereft of wealth nor inflicted by any kinds of skin diseases
16 Mukhi/ Hari and Shankar	Ketu/ -	16 natural lines (mukha) on its surface	Om Namah Shivaya	Leprosy, tuberculosis and lung diseases	It represents victory and the possessor is never affected by heat or cold. It is especially useful for the saints living in jungles. The house in which it is kept is free from fire, theft or robbery
17 Mukhi/ Lord Viswakarma	None/ -	17 natural lines (mukhas) on its surface	Om Namah Shivaya	Memory lapse and body functional disorders	It represents Vishvakarma the builder of this world. It is very effective in gaining unexpected money. It is especially useful in attaining property, vehicles and all physical assets
18 Mukhi/ Bhairav	None/ -	18 natural lines (mukhas) on its surface	Om Namah Shivaya	Mental harmonization and loss or power	It represents the mother earth. The possessor remains happy and healthy. It is especially beneficial for the pregnant women in protecting their child
19 Mukhi/ Vishnu narayan	Mercury/ -	19 natural lines (mukhas) on its surface	Om Namah Shivaya	Blood disorder and spinal disorder	It represents Lord Narayana. The possessor is bestowed with all

		surface			worldly pleasures. There is no scarcity in their life
Trijuti or Tribhagi/ Brahma, Vishnu, Shiva	None/ -	Three naturally joined Rudrakshas are a rare phenomenon	Om Namah Shivay	Internal and external body disorders	Wearer becomes invincible
Gauri-sankar/ Shiva & Parvati	None/ Cancer, Scorpio	Two naturally joined Rudrakshas	OmShri Gaurish ankarey Namah	Sexual and behavioral disorders	Regarded the best for peace and comfort in the family. If a man worships Gauri Shankar at his worshipping place, the pain and suffering and other earthly obstacles are destroyed and the peace and pleasure of family are increased
Garbha – gauri/ Parvati & Ganasha	None/ -	Two beads joined together naturally	Om garbha Gauriya Namah	Gynecological disorders	For women wanting to have children. Her motherhood gains perfection

## TEST METHODS FOR ANALYSIS OF REAL ELAEOCARPUS

*Elaeocarpus ganitrus* is having various versions and the version of it increases the importance and price. It is made synthetically and the artificial *Elaeocarpus ganitrus* are also being sold in market. There are many methods of testing a genuine (or fake) *Elaeocarpus ganitrus*

**2.1 Cut test:** When beads are cut horizontally then the number of sections should be same as the number of lines

present on the beads. If it is not then drawback will be that the beads get damaged. It is most reliable methods

**2.2 Properties test:** This test gives information that whether the beads show properties like inductance, capacitance, conduction of electric current etc.

**2.3 Copper Coin test:** Generally it is believed that when the bead is placed between two copper coins then it will slightly rotate either clockwise or the anticlockwise direction. This phenomenon occurs due to physical and magnetic properties of the beads. Only expert people are good for it.

**2.4 Eye test:** There is a natural partition on beads which is just like the closed lips and

these deep linings (facets) can be seen with the help of magnifying glass (lenses). The artificial beads seem to be real but the facets cannot be made as real as those present on real one. Hence the real beads can easily be distinguished.

**2.4 Water test:** Some of the rare beads like GauriShankar or Trijuti can be made by synthetically joining two or three beads with help of paste etc. If such beads are kept in boiling water for some time then a sharp streak will take place at the joint and the synthetic beads can be identified.

#### **2.5 Scientific technique of identification**

**X-Ray:** This is a technique by which the internal structure is observed without damaging the beads. This digital X-ray test is done without complication for rudraksha beads up to nine mukhi but higher mukhi beads may not give 100% accurate results due to overlapping of the internal seeds.

**CT scanning:** This is another method for identification of beads but it is more expensive than X-ray. It gives much clear results for any beads than X-ray. CT scanning and X-ray are expensive methods to identify the beads but gives clear and accurate results. <sup>[10, 13, 19]</sup>

## **MEDICINAL & SCIENTIFIC VALUE OF RUDRAKASHA**

Rudraksha beads empower to cure the human body medicinally as well as spiritually due to its electromagnetic property.

The complete human body (nervous system) can be considered as a complex Bio electronic circuit. Different reflex actions takes place in body like pumping of the heart etc. and due to them number of electric impulses are generated. This is termed as Bioelectricity and the working

of all senses depends on the flow of bio electric current .The smooth flow of bio electric current results in the normal functioning of body parts.

During the condition of stress or maladjustment, this electronic circuit of body and mind is disrupted. The person will feel uncomfortable and will not be able to do work effectively. Rudraksha beads act as stabilizing anchor as it contain electric as well as magnetic field in it.

The electrical properties of rudraksha beads can be broadly categorized as –

#### **3.1 Resistance:**

Due to the potential difference in the body parts, there is a continuous flow of bio electric signals throughout the body. A particular mukhi rudraksha beads have a definite factor of resistance which is measured in ohms. When these beads resist the flow of bioelectric impulse in the body specific ampere of current flow is generated. These impulses stimulate certain positive brain chemicals which give positivity. The person feels more confident, self controlled and more energetic.

#### **3.2 Capacitance or the dielectric property:**

Due to the storage of electrical energy in rudraksha beads, they act as dielectric. So they become capable in stabilizing and anchoring the bioelectric current. Its value is measured in units of Farad. It is very helpful in controlling hyperactivity, palpitation of heart etc. In the case of stress where physical activity is increased, the heart beats faster i.e. increasing in overall hormones & nervous system which causes increase in bioelectric current. Rudraksha beads have the dielectric property i.e. storage of electrical energy, so it can make overall activity to normalcy.

#### **3.3 Inductance:**

Rudraksha beads are having the permanent magnetic properties so they can send out inductive vibrations with frequencies which are measured in units of Henry (Volt seconds/Ampere). Because of this property, people can feel better by seeing it only.

#### **3.4 Magnetic property:**

The popular process of magnetic healing is mainly due to the paramagnetic & diamagnetic properties of rudraksha beads. It also has one of the most important properties of dynamic polarity. The basic way of healing generally includes the reduction of the blockage of the arteries & vein which carries blood towards & from the heart to all parts of the body due to various reasons. The waste materials are being cleansed off by blood & carries oxygen and energy to various parts of body. The disruption in circulation of blood will lead to illness. Due to improper blood circulation pain is being experienced & hence the blood cells, arteries & veins are positively or negatively charged as magnets. When magnets (rudraksha beads) are being moved through various parts of body, the poles of magnets & body act concurrently. Hence the passage expands. Due to the streaming of blood circulation, suddenly the rejuvenated feeling occur along with healing & illness vanishes.

#### **3.5 Dynamic polarity:**

Rudraksha beads have the property of Diamagnetism. Blood circulation and heart beat automatically induces a magnetic field around the body and particularly the heart region. Bioelectricity automatically gives raise to bio magnetism depending on the polarity of the induced magnetic field. Rudraksha bead acquires a polarity that is opposite of the inducing field. As a result of this, the opening up the passages of arteries and veins are far better than that of magnets. Much better healing and rejuvenation is experienced.

Due to the dynamic property, it exerts a powerful anti-ageing property. <sup>[13, 19, 20]</sup>

## **CONSERVATION STATUS IN INDIA**

About 120 species of *Elaeocarpus* reported from different parts of Asia, including Nepal, Bhutan, Sikkim, Tibet, Java, Indonesia, and the foothill of the Himalayas, twenty five are found in different parts of India such as Uttar Pradesh, Maharashtra, Bihar, Madhya Pradesh, Assam, Arunachal Pradesh, and Meghalaya. The Rudraksha tree occurs sporadically in all districts of Assam, but is more frequent in Arunachal Pradesh. In Assam Rudraksha is found in places like Charaideu, Digboi, Margherita, Dibrugarh, Jorhat and Golaghat. In Arunachal Pradesh, it is common along the foothills of all districts, except Tawang and upper Subansiri. In recent years, the population of Rudraksha in Arunachal Pradesh is dwindling at an alarming rate. Presently, the species is nowhere common as reported by Kanjilal. Causes of decrease in population of the species are directly or indirectly related to excessive extraction of forest resources and often large-scale disturbances to forest ecosystems. Expanding urbanization, construction activities such as hydroelectric dams, buildings and roads, encroachment on vast areas of forest lands for extension of arable lands, logging, mining operations and shifting cultivation are some of the factors causing extensive damage to forests and depletion of biodiversity. In Arunachal Pradesh alone, prior to the Supreme Court ban on felling, there were 17 plywood mills, 14 veneer units +and nearly 40 sawmills of various sizes and capacities.

These industries consumed over 9.8 million cubic feet of timber annually. The illegal logging operations, though confined to more inaccessible areas in Arunachal Pradesh, are destroying and fragmenting the habitat of Rudraksha. So, the tree is being pushed to the threatened category (currently not listed in the Red data book) and may even become extinct in the future if immediate conservation measures are not taken up.<sup>[21]</sup>

## PHARMACOLOGICAL ACTIVITIES OF ELAEOCARPUS GANITRUS

### 5.1 Analgesic and anti-inflammatory effect

Analgesic and anti-inflammatory study has been done by taking petroleum ether, chloroform, methanol and aqueous extract of *Elaeocarpus ganitrus* leaves for analgesic and anti-inflammatory potentials using carrageenan-induced paw edema (inflammation) in rats and tail flick tests in mice. The methanol and aqueous extract of *Elaeocarpus ganitrus* leaves at all doses (50, 100, 200 mg/kg) showed significant ( $p < 0.05$ ) percentage inhibition of edema at 3rd hr of treatment when compared with control group but maximum percentage inhibition of edema at dose 200mg/kg (i.e. 46.21% and 41.66%) for both extracts. While the standard drug Diclofenac sodium (5mg/kg) showed significant inhibition of edema at 3rd hr of treatment is 49.40%. For analgesic activity it is also concluded that the methanol and aqueous extract of *Elaeocarpus ganitrus* leaves at dose 100 mg/kg showed significant ( $p < 0.05$ ) increase in tail flick response. Therefore, it can be inferred that the inhibitory effect of methanolic and

aqueous extract at dose 200 mg/kg of *Elaeocarpus ganitrus* leaves on carrageenan induced inflammation may be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis.

In an another study sequential petroleum ether (PE), benzene (BE), chloroform(CE), acetone (AE) and ethanol (EE) extracts (50-200 or 200 mg/kg, ip, or 200 mg/kg, po ) of dried *Elaeocarpus ganitrus* fruits, pretreatment time 30-45 min, showed significant anti-inflammatory action against both acute and sub-acute models, analgesic, barbiturate-hypnosis potentiating an antiulcer genic activities in rats. All the extracts, except PE and EE decreased swim stress immobility in mice indicating some degree of antidepressant activity. All the extracts protected guinea-pigs against bronchospasm induced by histamine and acetylcholine aerosols. Chemically, the extracts showed the presence of glycosides, steroids, alkaloids and flavonoids.<sup>[22, 23]</sup>

### 5.2 Antioxidant

Oxygen is essential for the survival of all living creatures on this earth. During the process of oxygen utilization in normal physiological and metabolic processes approximately 5% of oxygen gets univalently reduced to oxygen derived free radicals like superoxide, hydrogen peroxide, hydroxyl and nitric oxide radicals. All these radicals known as reactive oxygen species (ROS) exert oxidative stress towards the cells of human body rendering each cell to face about 10000 oxidative hits per second. When generation of ROS overtakes the antioxidant defense of the cells, the free radicals start attacking the cell proteins, lipids and carbohydrates (4-6) and this leads to a number of physiological disorders.



Ethanol extract of leaves of *Elaeocarpus ganitrus* was analyzed for their total antioxidant capacity, reducing power, metal chelating, ABTS<sup>+</sup> (2, 2-azinobis-(3-ethylbenzothiazoline-6-sulphonate) radical scavenging and hydroxyl radical scavenging activities. The extract at 500 µg/ml showed maximum Iron chelating activity (76.70%) followed by the scavenging of the ABTS<sup>+</sup> radical (55.77%) at the same concentration. However, the extract showed only moderate hydroxyl radical scavenging activity (13.43%). Total antioxidant capacity was found to be 24.18 mg ascorbic acid equivalents at 500 µg/ml extract concentration. There was a positive correlation between the total phenolic content and antioxidant capacity,  $R^2 = 0.8547$ , whereas the correlation between the total flavonoids and antioxidant capacity was determined to be  $R^2=0.8413$ . The results suggest that phenolics and flavonoids in the leaves provide substantial antioxidant activity.<sup>[24]</sup>

### 5.3 Anti hypertensive

Hypertension is the leading cause of cardiovascular disease worldwide. Despite a diversity of pharmacological agents to treat high blood pressure, suboptimal control remains a significant problem in as many as 43% of patients and this rate has not significantly improved over the past two decades. There are a variety of factors contributing to this including patient's non-adherence due to complex drug regimens and medications side effects, under-treatment and treatment resistance. There, thus, remains a need to find herbal treatment to antihypertensive therapy that facilitate attainment of optimal blood pressure levels. *Elaeocarpus ganitrus* reported for its anti hypertensive activity, Aqueous extract of *Elaeocarpus ganitrus* seed powder was evaluated for its antihypertensive activity in renal artery occluded hypertensive rats. Male wistar

rats (180-200g) were pretreated with aqueous extract of *E. ganitrus* for six weeks. Hypertension was induced in animals by clamping the renal artery with renal bulldog clamp for 4 hr. Ischemia of the kidneys causes elevation of blood pressure by activation of the renin-angiotensin system. Elevated blood pressure of the animals was significantly ( $p<0.05$ ) decreased by the aqueous extract of *E. ganitrus* at the dose levels of 25, 50 and 100mg/kg, *i.v.* Captopril, angiotensin converting enzyme inhibitor (ACE-I) at the dose of 1 mg/kg, *i.v.* showed significantly ( $p<0.05$ ) reduced in the elevated blood pressure. The antihypertensive activity of aqueous extract of *E. ganitrus* may be due to the action on rennin-angiotensin system.

Another study highlights the effect of *Elaeocarpus ganitrus* in experimentally induced acute hypertension by adrenaline and nicotine. Study was done in six anaesthetized cats having similar body weight and age. 90 % Ethanol extracts of *Elaeocarpus ganitrus* was given intravenously to cats. Blood pressure was measured by using Pressure transducer and Polyrite (INCO). *Elaeocarpus ganitrus* reduces adrenaline induced hypertension and also normal blood pressure; but it is not effective in nicotine induced hypertension. The effect of the drug was found when the water soluble portion of the extract was given to cats in a dose of 15mg / kg body weight.<sup>[25-27]</sup>

### 5.4 Antimicrobial activity

*Elaeocarpus ganitrus* is an evergreen tree found worldwide. Antimicrobial activity of the aqueous extract of leaves of *E. ganitrus* was tested against clinical isolates of bacteria and fungi. In vitro antimicrobial activity was performed by agar well diffusion method on Mueller Hinton agar and Sabouraud Dextrose agar for bacterial and fungal cultures

respectively. The extract exhibited a broad spectrum of antimicrobial activity as it inhibited the growth of *Staphylococcus aureus*, *Bacillus cereus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Penicillium sp*, *Aspergillus flavus*, *Candida albicans* and *C. tropicalis*. The extract showed maximum relative percentage inhibition against *B. cereus* (124.16%). Minimum inhibitory concentration test was performed by modified agar well diffusion method. Minimum inhibitory concentration values of the extract varied from 125-2000 µg/ml; however minimum value was reported against *B. cereus* and *A. flavus* (125µg/ml). The results indicate the potential use of *E. ganitrus* leaves for the development of antimicrobial compounds. [28, 29]

### 5.5 Antianxiety

Anxiety is a mental disorder it is characterized by excessive, uncontrollable and often irrational worry about everyday things that is disproportionate to the actual source of worry, it is diagnosed as generalized anxiety disorder (GAD). The petroleum ether (PE), chloroform (CE), ethanol (EE) and water extractives (WE) of *Centaurea behen* and *Elaeocarpus ganitrus* were prepared and evaluated for antianxiety activity in mice using elevated plus maize model. The results were compared with standard drug, diazepam. The ethanol extractive of *C. behen* (200 mg/kg) and chloroform and ethanol extractives of *E. ganitrus* (200 and 400 mg/kg) significantly increased the time spent and percentage of the open arm entries in the elevated plus maize model and hence exhibited antianxiety activity, which was comparable to diazepam. Chemically the extracts of both the plants showed the presence of phytosterols, fats, alkaloids, flavonoids, carbohydrates, proteins and tannins. The anxiolytic effects

of the ethanol extractive of *C. behen* and chloroform and ethanol extractives of *E. ganitrus* may be related to their alkaloid and flavonoid content. The results indicate that both the plants can be considered as potential candidate for bioactivity guided isolation of natural antianxiety agents. [30]

### 5.6 Antidiabetic

The anti diabetic effect of *Elaeocarpus ganitrus* was evaluated in rats by single dose at three graded dose levels, 250,500,1000mg/kg body weight. Anti hyperglycemic activity of the extract was also evaluated at the same dose level in streptozotocin (60 mg/kg, ip) induced diabetic rats during a 30-days treatment period. Metformin (500mg/kg) was used as the reference drug. Fasting blood glucose and lipid parameters, viz. triglycerides, total cholesterol, high-density lipoprotein and low density lipoprotein levels were measured. Acute oral toxicity of the extract was carried out in Swiss albino mice. The investigation shows that *Elaeocarpus ganitrus* seeds have potential anti diabetic effects. In another study water extract of leaves, fruits and twigs of *Elaeocarpus grandiflorus* shows alloxan induced anti diabetic activity. [31, 32]

### 5.7 Antifungal

*Elaeocarpus ganitrus* have antifungal activity the chloroform and ethanol extracts of *Elaeocarpus ganitrus* have high antifungal activity against *Candida albicans*. Whereas, chloroform, ethanol and water extract showed moderate inhibition against *Aspergillus niger*. [33]

### 5.8 Antidepressant effect

The water portion of 90% ethanol extract of the fruits of *Elaeocarpus ganitrus* showed the presence of a prominent central nervous system depressant effect, characterized by typical behavioral actions, potentiating of hexobarbitone hypnosis and morphine analgesia,

anticonvulsant and anti-amphetamine effects. In addition the extract showed a cardio stimulant, depressor, smooth muscle relaxant and hydrocholeretic activities, part of these being mediated through beta adrenoreceptor stimulation and in part through a direct musculotropic effect. The pharmacological profile of activity of the extract substantiates the use of the plant fruits in the treatment of mental diseases, epilepsy, hypertension, asthma and liver diseases in the ancient Indian systems of medicines. <sup>[10]</sup>

### 5.9 Anti-asthmatic

The *E. sphaericus* fruits showed effect on autocoid release during study conducted on rat mesenteric mast cell. The petroleum ether, benzene, chloroform, acetone and ethanol extracts of *E. sphaericus* fruits were found to have mast-cell stabilizing activity, substantiating the efficacy of *E. sphaericus* against bronchial asthma. <sup>[10, 34]</sup>

### 5.10 Safety factors

Rudraksha used traditionally in prescribed dosage may be considered safe.

LD<sub>50</sub> values of petroleum ether, benzene and chloroform, acetone and ethanol extract of fruit are 620,560,670,575 and 780 mg/kg p o, respectively in mice. LD<sub>50</sub> of the 90% ethanolic extract is 792mg/kg ip in rats. <sup>[6]</sup>

## RESULTS AND DISCUSSION

Rudraksha (*Elaeocarpus ganitrus*) is very popular plant since historic times. The written evidences are found in various classical text as well as modern text e.g. Raj Nighantu, Bhavprakash Nighantu, Dravyaguna vijnana, Indian materia medica, Indian medicinal plant etc.

This plant has number of synonyms e.g. chattusampangi, bhutnasan, rudraki, rudrakya, rudraksam etc. It is reported to

have sweet taste with sweet metabolic property due to its property of uncutousness & bulkiness it is having cold potency. Few have mentioned hot potency also.

Various researches have been done and medicinally important constituent are isolated. Chemical constituents which are present in it are linoleic, myristic, isopalmitic, isostearic, lauric, tetradecanoic, elaeocarpidine, (+) – epielaecarpiline, (+) –elaecarpine, rudrakine etc. It can be used internally as well as externally. Researchers have proved its antibacterial, antioxidant, antidiabetic antihypertensive, antianxiety etc. It also has astrological uses according to the types of beads e.g. 1 mukhi for enlightens the super consciousness, provides improved concentration and mental structure changes specific to renunciation from worldly affairs. The wearer enjoys all comforts at his command but still remains unattached, 2 mukhi Blesses the wearer with 'UNITY'. It could be related to guru-shishya, parents-children, husband-wife or friends. Maintaining oneness is its peculiarity, 3 mukhi the wearer gets free from sins or wrongs from his life and returns to purity. Ideal for those who suffer from inferior complexes, subjective fear, guilt and depression etc. various scientific methods like cut test, water test etc. are adopted to check the genuanicity of rudraksha (*Elaeocarpus ganitrus*) which is beneficial in various disorder.

Classical formulations e.g. Gorochanadi vati , Mrtasanjivani gutica etc. are mentioned and more extensive work can be carried out for more formulations in the market which can serve the mankind for its betterment.

## CONCLUSION

Rudraksha (*Elaeocarpus ganitrus*) is a beneficial plant. It is used astrologically as well as medicinally. It can cure various disorders like dahasaman (burning sensation), jwar (fever), prameha (diabetes), raktabharsamak (hypertension) etc. from future prospect research can be done to bring its formulations in the

market. Rudraksha contain electric as well as magnetic field. Nowadays, extremely low frequency magnetic field is considered as therapeutic agent and so used in medicines. Extremely low frequency magnetic field can initiate a number of biochemical & physiological alteration in biological system which can be used to overcome the conditions of stress & maladjustment.

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