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Rudraksha: A Smart Drug And A Smart Nutrients: A Review

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Background: Rudraksha has excellent mineral characteristics, making it a smart medication and smart nutrition. In Ayurveda, the highly prized plant is believed to have sprung from Lord Shiva's tears, offering tremendous therapeutic and astrological advantages for human existence.

Methodology: To conduct a thorough evaluation of the literature, databases from Springer, Elsevier, PubMed, and Science Direct were used.

Result and Discussion : In addition to its scientific use, Rudraksha has unique characteristics that make it possible to heal a wide range of incurable ailments. It also serves a significant spiritual function in a man's everyday life. Biochemical analysis, electromagnetic analysis, and chemical composition can provide all the necessary chemical information about rudraksha. Accurate information about its scientific properties reveals that Rudraksha is a highly potent plant that will greatly benefit our medical research. Additionally, traditional mythological and astrological values describe the various types of Rudraksha; generally, each type has 1–14 faces (Mukhi), each with a unique value.

Conclusion: Contemporary medicine has utilized the rich pharmacological and therapeutic properties of rudraksha, such as its analgesic, antioxidant, antifungal, antidiabetic, hepatoprotective, immunomodulator and antidepressant properties.

Keywords: Rudraksha, Medical science, Smart nutrients, Ayurveda, Pharmacological activity.

INTRODUCTION

In traditional medicine, the *Elaeocarpus ganitrus* (L.) fruit, technically known as the rudraksha bead, has immense spiritual and therapeutic value. A number of review studies on the Ayurvedic medical system mentioned the therapeutic benefits of wearing Rudraksha beads against rheumatism, infertility, neurological and cardiovascular illnesses, and other ailments. Also, it has been said that the pharmacological properties of Rudraksha beads depend on the type of grooves, or Mukhis, that surround a dense cellular endosperm made of calcium oxalate druses. Since ancient times, people have prized these fruits for their mythological, artistic, and therapeutic qualities.

Elaeocarpus ganitrus trees are found from China, South and Southeast Asia, sections of Australia, Guam, Hawaii, and the Gangetic plain in the foothills of the Himalayas. They may reach heights of up to 20 meters. Rudraksha trees are often found in Nepal's mountainous and hilly regions, as well as in Java and Sumatra, Indonesia. The mature fruit of *Elaeocarpus ganitrus roxb* is used to make dried rudrakasha beads. Studies using mice found that the seeds have a membrane seed coat and a firm endocarp with lignified isodiametric sclereids. Rudraksha is derived literally from two Sanskrit words: "aksha," which means eyes, and "rudra," which is a synonym for Lord Shiva. Because the beads are protected by a blue outer shell after they have completely ripened, they are also known as blueberry beads. According to legend, the plant has immense powers that could

summon three demons named *Tripurasuras.* Their home was Purams, a structure erected in the sky that swung about an area of space. The Purams were blessed by Lord Ganesha with the knowledge that nothing can hurt them until they came into contact with one another. There's just one chance in a thousand years for it to happen. All gods prayed to Lord Shiva, who was determined to destroy those demons. With one eye half closed, Lord Shiva performed Tapasya (meditation) (Ardhanimeelitaneetra). Burning Tripurams and strained on the axis, he opened his eyes. His eyes opened with tears that transformed into rudraksha due to the tension that Tapasya had induced. Known by most as Rudraksha, the fruits of this plant are used in ancient Ayurvedic medicine to treat mental illnesses, epilepsy, asthma, hypertension, arthritis, and liver ailments. Fruits of *E. ganitrus* are rich in flavonoids, alkaloids, steroids, and glycosides. In addition, it has been discovered that the fruit's exocarp offers customers a nutrient-dense incentive. It is mostly rich in proteins (4.3% dry mass, or 0.12 g per fruit) and carbs (21.0% dry mass, or 0.58 g per fruit) [1-4].

Botanical description

It's a big evergreen tree with enormous leaves. Its height ranges from 200 to 50 feet. When facing the sun, leaves are big and brilliant green; when facing the ground, they are drab and stringy. April and May are when flowers first appear, and they are either white or yellow in hue. Source and range Rudraksha, scientifically known as *Elaeocarpus ganitrus*, thrives in tropical and subtropical climates at elevations ranging from sea level to 2,000 meters [5].

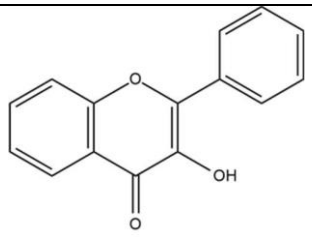
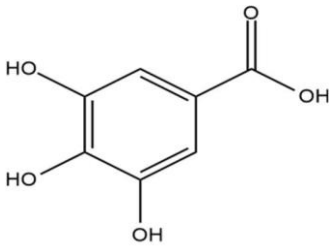
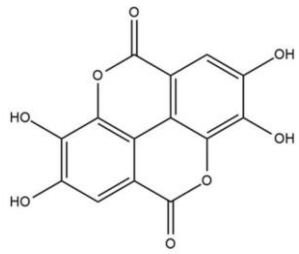
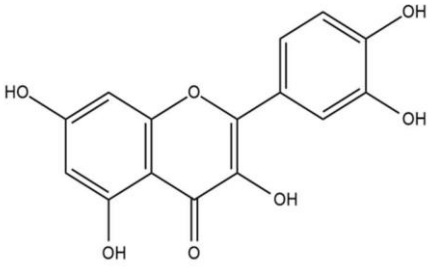
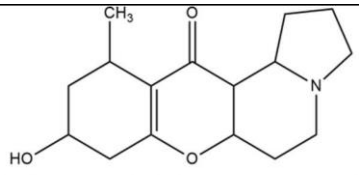
Table-1 Scientific classification of *Elaeocarpus ganitrus*

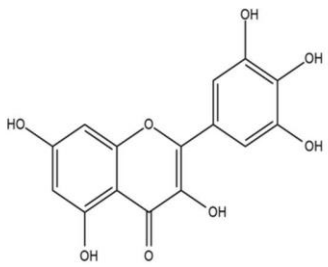
Botanical Name	*Elaeocarpus Ganitrus* (Roxb.)
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Oxalidales
Family	*Elaeocarpaceae*
Genus	Elaeocarpus
Species	E. Ganitrus
Ayurvedic name	Rudraksha
Hindi name	Rudraki
English name	Utrasum Bead tree
Trade name	Rudraksh

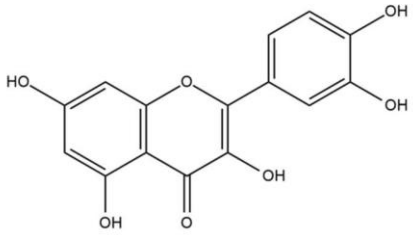
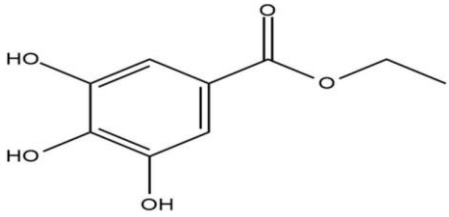
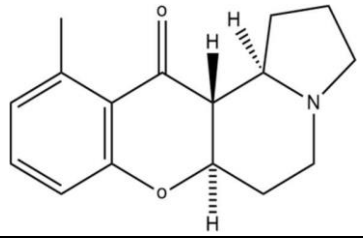
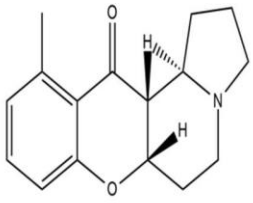
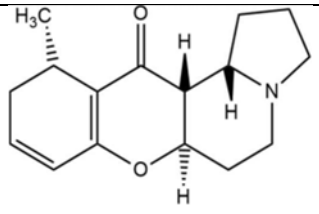
Active constituents

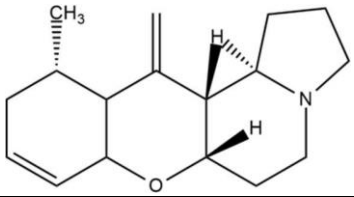
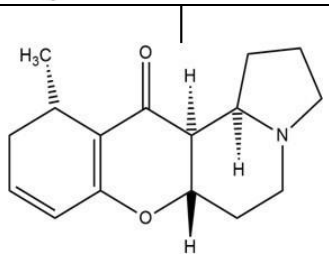
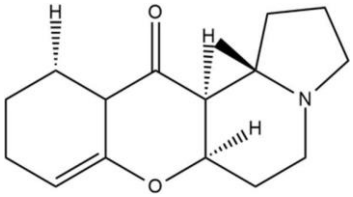
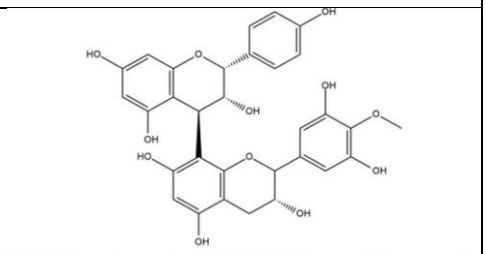
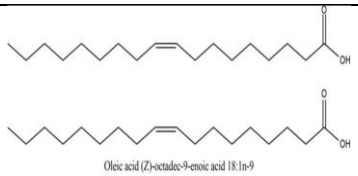
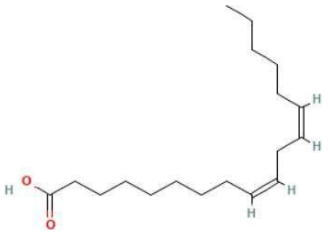
Elaeocarpus ganitrus fruit has many plant-based substances, such as alkaloids, flavonoids, tannins, carbohydrates, steroids, triterpenoids, and cardiac glycosides. The fruit also contains a considerable quantity of phytocomponents, such as gallic, ellagic, and rudrakine acids, quercetin, isoelaeocarpicine, and elaeocapine. Rudraksha beads contain mixed forms of carbon, hydrogen, oxygen, nitrogen, and trace elements. In that order, the percentage composition of gaseous elements in rudraksha beads is 50.031%, 17.897%, 30.53%, and 0.95%. The alkaloids in rudraksha belong to the indolizidine group. Numerous synthetic studies have focused on the wide range of biological actions demonstrated by indolizidine alkaloids. In addition, it contains flavanoids, steroids, vitamins, and minerals. Leaf aqueous extract also includes glycosides. Gallic acid, ellagic acid, and quercetin are present in ethanolic leaf extract. Rudraksha contains indolizidine-class alkaloids. Many different parts of nature, including many plants and animals, contain indolizidines [6].

Table -2 Phytoconstituents of *Elaeocarpus ganitrus*

Phytoconstituents	Structure
Flavonol	 3-hydroxy-2-phenylchromen-4-one
Gallic acid	 3,4,5-trihydroxy benzoic acid
Ellagic acid	 2,3,7,8-Tetrahydroxy[1]benzopyrano[5,4,3-cde][1]benzopyran-5,10-dione
Quercetin	 2-(3,4-dihydroxyphenyl)-3,5,7-trihydroxychromen-4-one
Rudrakine	 9-hydroxy-11-methyl-2,3,6,6a,8,9,10,11,12a,12b-decahydro-1*H*-chromeno[2,3-*g*]indolizin-12(5*H*)-one

Myricetin	 3,5,7-trihydroxy-2-(3,4,5-trihydroxyphenyl)-4H-1-benzopyran-4-one

Kaempferol	 2-(3,4-dihydroxyphenyl)-3,5,7-trihydroxychromen-4-one
Ethyl gallate	 ethyl 3,4,5-trihydroxybenzoate
Elaeocarpine	
Isoelaeocarpine	 11-Methyl-1,2,3,5,6,6a,12a,12b-octahydro-12H-[1]benzopyrano[2,3-g]indolizin-12-one
Alloelaeocarpiline	

Epielaeocarpiline	
Epialloelaeocarpiline	
Isoelaeocarpiline	
Proanthocyanidins	 (3R)-2-(3,5-dihydroxy-4-methoxyphenyl)-8-[(2R,3R,4R)-3,5,7-trihydroxy-2-(4-hydroxyphenyl)-3,4-dihydro-2H-chromen-4-yl]-3,4-dihydro-2H-chromene-3,5,7-triol
Oleic acid	 Oleic acid (Z)-octadec-9-enoic acid 18:1n-9
Palmitic acid	 hexadecanoic acid
Linoleic acid	

Types of Rudraksha

Figure-1 Types of Rudraksha [7]

Ethnomedicinal Uses Rudraksha

Ayurveda claims that rudraksha seeds are full of health advantages. Ayurveda uses rudraksha seeds to treat a variety of illnesses such as rheumatism, melancholy, anxiety, insomnia, nervousness, lack of focus, and infertility. They also have immunological modulating qualities. Rudraksha has antiaging and asthmatic qualities. The Rudraksha seed's electromagnetic impulse influences the body and helps treat a variety of ailments [8].

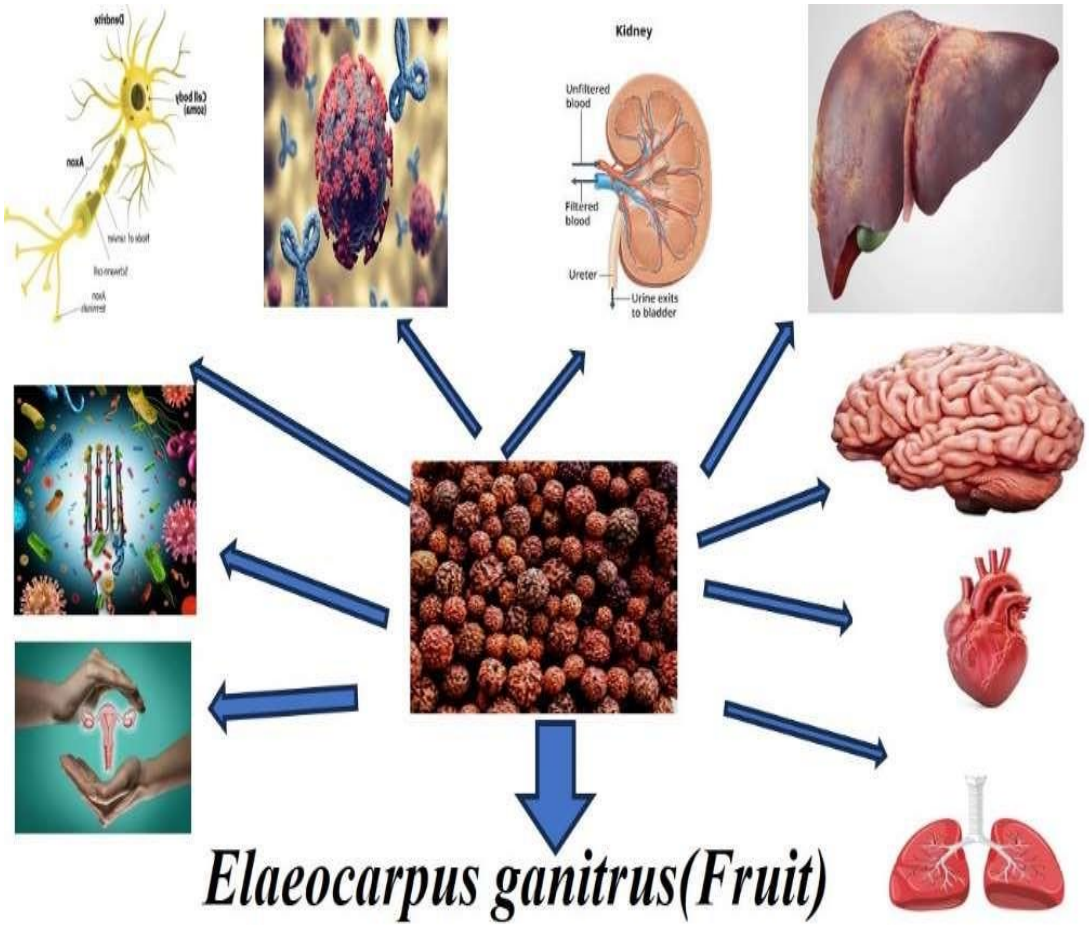


Figure-2 Pharmacological action of Rudraksha

Table -3 Analyse the pharmacological effects of several Elaeocarpus species[9-31]

Researchers	Species of *Elaeocarpus*	Objectives	Plant Extract and Methods	Activity and Result
Antimicrobial &Antifungal activity				
(Singh & Nath 1999)	*Elaeocarpus sphaericus*	E. sphaericus antimicrobial activity investigation	Petroleum ether, chlorofor benzene, m, acetone ethanol an d	Antimicrobial activity is in compliance with eleven microbes.
(Singh, et al. 2010)	*Elaeocarpus ganitrus*	antifungal properties	Aqueous Petroleum extract, chloroform, ethanol	Fruit extracts include antifungal strains.
(Kumar *et al.*, 2011)	*Elaeocarpus ganitrus*	Studies on the antimicrobial activity of E. ganitrus using an in vitro technique	Aqueous extract	Possibility of using E. ganitrus leaves to create antibacterial compounds.
(de Lima *et al.*, 2019)	*Elaeocarpus serratus*	Must be aware of the fruit extract from E. serratus's bioactive ingredients and antibacterial properties.	Ethanolic extract of the fruit	The antimicrobial activity showed against B. cereus, E. coli, S. cholaresuis, S. Aureus.
(Jayashree *et al.*, 2014)	*Elaeocarpus serratus*	Assessment of E. serratus's antibacterial potential	Aceto and ne methano extract l s	The treatment of microbial infections may be approached from a broad range antibacterial viewpoint.
(Sakha *et al.*, 2018)	*Elaeocarpus ganitrus* with other plant species	Research on antimicrobi is against harmful bacterial Human activity	Ethanolic extracts	Antibacterial action against S. aureus was shown by *E. ganitrus* leaves.
(Manoharan *et al.*, 2019)	*Elaeocarpus tectorius*	Antioxidant and antimicroStudies on the antibacterial and antioxidant properties o f E.	Petroleum, ether, Dichloromethane, Ethyl acetate, Methanol and water	The formulation of the herbal medication may be used to treat UTIs.

		tectorius bial investigations of *E. tectorius*		
(Ogundele *et al.*, 2021)	*Elaeocarpus floribundus*	To understand the Inhibitory Activity of α-Amylase and Antimicrobial	Hydroethanolic extract	The encouragingly favourable outcome attained
Anticancer activity and Antihypertensive activity				
(Fang *et al.*, 1984)	*Elaeocarpus dolichostylus*	To investigate anticancer efficacy and cytotoxicity	Ethanol	Plants with isolated phytoconstituents that cause cytotoxicity
(Turner *et al*., 2020)	*Elaeocarpus reticulatus*	The purpose of the research was to separate and identify possible anti-pancreatic cancer cell chemicals in E. reticulatus fruit.	50% acetone	Favorable outcomes in the crude extract
(Balamuru *et al*., gan 2022)	*Elaeocarpus variabilis Zmarzty*	The purpose of the research was to separate and identify possible anti-pancreatic cancer cell chemicals in E. reticulatus fruit.	Ethyl acetate extract	The crude extract exhibited good antitumor action.
(Sakat et al. 2009)	*Elaeocarpus ganitrus Roxb*	*Tested the antihypertensive effects of powdered Elaeocarpus ganitrus Roxb. seeds aqueous extract in hypertensive rats with blocked renal arteries.*	*Aqueous extract*	Display antihypertensive properties
(Sharma et al. 2004)	Elaeocarpus ganitrus Roxb	Acute hypertension produced in an experiment using nicotine and adrenaline.	Ethanol extract	Elaeocarpus ganitrus (Roxb) lowers hypertension brought on by adrenaline.

Antidiabetic activity				
(Hule *et al.*, 2011)	*Elaeocarpus ganitrus*	To investigate E. ganitrus's antidiabetic properties in test animals.	Water	Significant hypoglycaemic effect.
(Tripathi *et al.*, 2015)	*Elaeocarpus ganitrus*	Understanding the antihyperglycemic properties of rudraksha, or E. ginganerus Roxb, in Diabetes brought on by streptozotocin.	Methanolic extracts	Strong hypoglycemic effects.
(Rao *et al.*, 2012)	*Elaeocarpus ganitrus*	To learn about the aqueous chitosan extract of E. ganitrus's hypoglycemic and antidiabetic properties.	Aqueous extract	Anti-diabetic effect.
(Keertha & Chitrana 2020)	*Elaeocarpus tectorius*	To determine the chemical components of E. tectorius fruits' antidiabetic efficacy	Ethanolic extracts	Anti-diabetic effect.
Antidepressant Effect				
(Dadhich *et al.*, 2014)	*Elaeocarpus ganitrus*	To determine the chemical components of E. tectorius fruits' antidiabetic efficacy	75% ethanol extract	Have sedative properties at high doses but antidepressant effects at moderate doses in examined animals.
(Lakshmi.T et al., 2011)	*Elaeocarpus ganitrus*	Examine the sedative, tranquillizing, anticonvulsive, and hypnotic effects.	Ethanol extract	At doses of 25, 50, and 100 mg/kg, an ethanolic extract of the fruit of *E. ganitrus* shows sedative, hypnotic,

(Singh *et al*., 2012)	*Elaeocarpus ganitrus* with *Centaurea behen* Linn.	The antianxiety properties of Centaurea behen Linn combined with an E. ganitrus.	Petroleum ether, chloroform, ethanol and water	Work against effective Anxiety
(Shah et al, 2010)	*Elaeocarpus ganitrus*	*Assess Anxiolytic Impacts*	Methanol extract	At 200 mg/kg, a methanolic extract of *Elaeocarpus sphaericus* fruits has anxiolytic properties.
(Bopaiah et al., 2000)	*Elaeocarpus ganitrus* ayurvedic preparation	*Antidepressant activity*	Ethanol extracts	This demonstrated that the active ingredients in the ayurvedic preparation's 50% ethanol extract exhibit antidepressant properties.
Asthmatic Activity				
(Cho *et al*., 2013)	*Elaeocarpus petiolatus*	Reduction of asthmatic response in mice given OVA	Ethanol	A result positive was found.
Ameliorative activity				
.				
(Kakalij *et al*., 2014)	*Elaeocarpus ganitrus*	The purpose of the research is to assess the ameliorative impact	*E. ganitrus* crude drug100, 200, and 400 mg/kg body weight	Nephroprotective and immunomodulatory properties are present in *E. ganitrus* seeds.
Anti-inflammatory effect				
(Singh et al., 2000)	*Elaeocarpus sphaericus*	Assessments of inflammatory activity	Petroleum ether (PE), benzene (BE), chloroform (CE), acetone (AE) and ethanol (EE) extracts	With the exception of PE extract, all extracts show Inflammation.

(Garg et al.,2012)	*Elaeocarpus sphaericus*	Assessments of analgesic efficacy	Ether, chloroform, methanol and aqueous extract	*Elaeocarpus sphaericus* leaf methanol and aqueous extract, at 100 mg/kg, significantly ($p<0.05$) increased the tail flick response in terms of analgesic action.
Mast-cell stabilizing activity				
(Singh *et al.*, 2000)	*Elaeocarpus sphaericus*	Investigating the impact of E. sphaericus fruits on autacoids using rat mast cell research.	Petroleum ether, benzene, chloroform, acetone, ethanol	*Fruits of E. sphaericus were shown to have the ability to stabilise mast cells.*
Parkinson's disease				
(Singh *et al.*, 2000)	*Elaeocarpus floribundus*	The objective of the research is to separate the flavonoids from E. floribundus and assess their MAO-inhibitory qualities.	flavonoids from Plant were chosen for the experiment	Myricitrin increased dopamine levels and inhibited MAO in the mouse brain.

Table-4 The composition of rudraksha bead powder in terms of element concentration is described.

Metal Type	Metal component	Ppm
Main Group Element	Calcium	2400±0.023
	Potassium	1100±0.034
	Silicone	700±0.008
	Magnesium	600±0.003
	Sulfur	400±0.005
	Chlorine	300±0.003
	Phosphorus	200±0.002
	Aluminium	200±0.004
	Sodium	100±0.001
	Strontium	11±0.008

Transition metals	Iron	800±0.009
	Palladium	26±0.008
	Ruthenium	26±0.007
	Copper	12±0.001
	Manganese	11±0.002
	Nickel	7±0.000
	Selenium	6±0.001
	Zinc	0.018±0.002
	Molybdenum	0.016±0.005

Experiment to Know Real (Genuine) or Umreal (Fake) Rudraksha

In response to the growing demand for rudraksha beads, vendors have begun producing uncommon beads like the Ek Mukhi Rudraksha, which has one face. Vendors make Rudraksha beads from Bhadraksha, Areca nut, Nutmeg, or Tulsi beads. The genuine Rudraksha is often misunderstood. People have been tricked by con artists using phoney Rudraksha. Furthermore, not many consumers are confident in the state of the rudraksha market.

Cut Test

Taking a horizontal incision on the Rudraksha bead is a foolproof procedure. The number of compartments is precisely equal to the number of lines. The drawback is that the beads tend to break easily. Test of Properties The second is to determine if the beads show characteristics like capacitance, inductance, and electric current conduction, among others. The copper coins were tested. Rudraksha beads should revolve slightly when positioned between two copper coins. This is due to the magnetic and physical properties of the Rudraksha beads. This exam requires a high degree of skill to pass.

Ocular test

It is possible for a manufactured or fake Rudraksha to seem authentic. The term "facets" or "mukhis" refers to the deep lining that runs from the top to the lowest half of the Rudraksha. Using a magnifying lens to examine these deep linings, or facets, one may quickly identify an authentic Rudraksha (Fig. 3). Test of the water Occasionally, two or three Rudrakshas are intentionally joined with glue or other materials to create a highly valuable Rudraksha (Gaurishankar Rudraksha or a Trijuti). Rudraksha of this kind should, if in doubt, be cooked in water for one to two hours. If the Rudraksha is fake, the joint will become noticeably discoloured. The so-called "water test" in which the Rudraksha bead is submerged in water is unreliable. Test for Water Sinks A lead-impregnated, wood-based imitation of a Rudraksha would sink in water, creating the illusion that it is a genuine one. Occasionally, readily accessible actual Rudraksha beads of lower value are tempered to create a rare Rudraksha (like one mukhi). Rudraksha like that will also sink in water. Even now, it remains one of the most often used techniques for testing the beads and frequently yields precise findings.

Water Sink Test

A lead-impregnated wood Rudraksha (Fig. 3) will sink in water, creating the illusion that it is a genuine Rudraksha. Occasionally, people temper readily accessible actual Rudraksha beads of lower value to create a rare Rudraksha (such as one mukhi). Such a Rudraksha will also sink in water. Nevertheless, it remains one of the most often used techniques for testing the beads and frequently yields precise findings. Verifying rudraksha's authenticity [8].

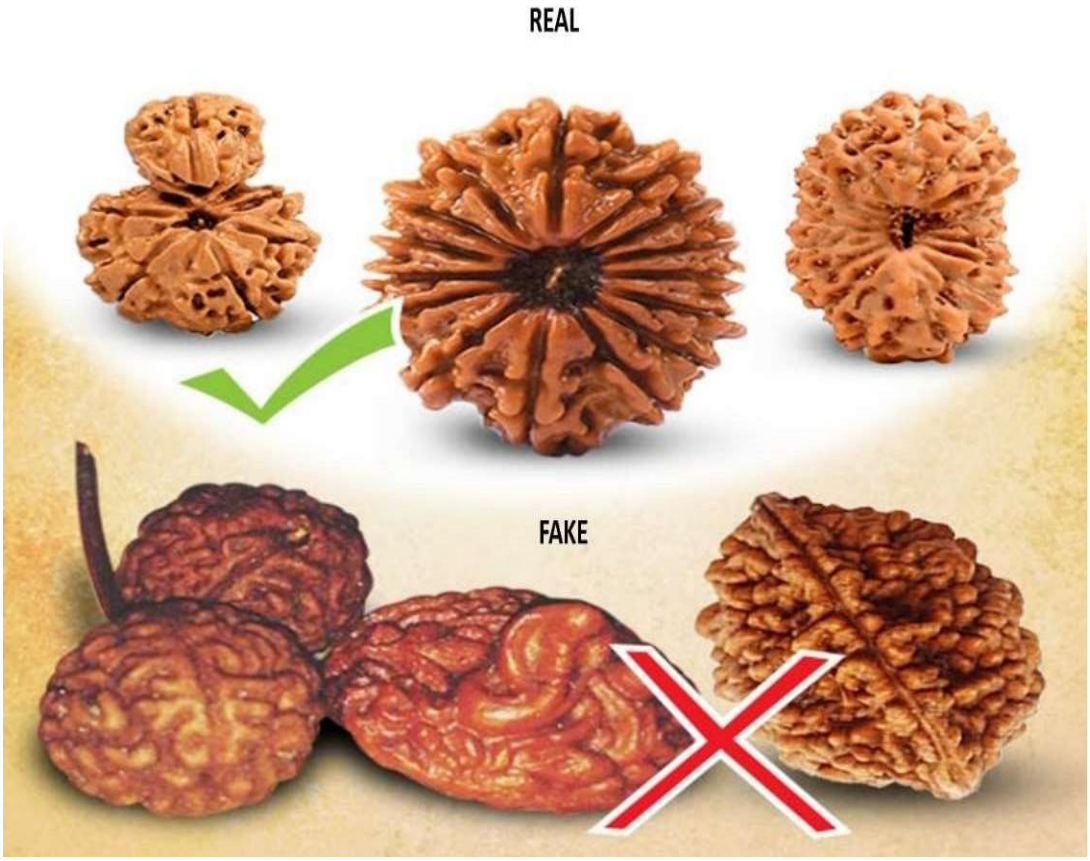


Figure-3 Display the original and fake Rudraksha

Conclusion:

Traditional medicine uses various elements of the Rudraksha plant, such as the beads, bark, leaves, and outer shell, to treat a range of illnesses, including skin conditions, fever, headaches, mental disorders, and wound healing. Traditional medicine uses Rudraksha fruits to cure a variety of ailments such as bronchitis, neuralgia, cephalagia, anorexia, migraines, and manic episodes. Ayurvedic scriptures also classify them as thermogenic, sedative, and cough relievers. In folk medicine, it is used as a counter-agent for conditions including liver illnesses, asthma, hypertension, arthritis, palpitations, nerve pain, stress, anxiety, depression, and epilepsy. Additionally, studies have demonstrated its wide range of pharmacological properties, which include strong antibacterial, hypoglycemic, analgesic, anti-inflammatory, and antiulcerogenic properties. Scientists attribute the majority of E. citrus's medicinal potential to its phytosterols, lipids, alkaloids, flavonoids, carbohydrates, proteins, and tannins. Folk medicine uses it to treat a variety of conditions, including anxiety, depression, palpitations, nerve pain, epilepsy, migraines, stress, asthma, hypertension, arthritis, and liver illnesses. The Ayurvedic medical system states that wearing rudraksha may benefit the heart and nerves. When fully grown, a blue outer shell coats its beads, earning them the nickname "blueberry beads". It plays a significant role in both the ancient Indian medical system known as Ayurveda and the Hindu faith. Hindi refers to it as Rudraksha. Rudrakasha fruits are helpful for cough, bronchitis, neuralgia, cephalagia, anorexia, migraine, manic episodes, and other brain problems. They are also thermogenic and sedative. People use the pulp or meat of drupes to treat mental illnesses, head injuries, and epilepsy. Furthermore, studies have demonstrated its wide range of pharmacological properties, including sedative, depressive, antiasthmatic, smooth muscle relaxant, hydrocholeretic, antiulcerogenic, antiinflammatory, and anticonvulsant effects. Worldwide research has shown that Elaeocarpus ganitrus (Roxb) contains important vital phytochemicals such as triterpenes, tannins like geraniin and 3, 4, 5-trimethoxy geraniin, indolizilidine alkaloids like grandisines and rudrakine, and flavonoids like quercitin. A capacitance of 1.03±0.011 μF was discovered in several bioactive extracts produced from Elaeocarpus ganitrus roxb (Shiva Sharma et al., 2018), showing its ability to retain electric charge. Minerals with excellent conductivity, such as potassium, magnesium, sodium, strontium, palladium, ruthenium, manganese, nickel, and molybdenum, along with a high protein and carbohydrate content, might be responsible for

Rudraksha's capacitance. Proteins and carbohydrates have superior dielectric and emulsifying qualities[32].

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Data Availability Statement:

The corresponding author has access to all the data supporting the presented research results upon request.

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Supplementary File

None.

Credit authorship contribution statement

All authors participate equally

References

1) Pradhan S, Bhoi Hitesh, Hanumanta Chaitnya., Rathore Gagan.et al. A Review Article: Medicinal, Astrological and Religious Comprehensive Description of Rudraksha. International Journal of Research Publication and Reviews, **5(1)**, 5104-5110 (2024).
2) Arivu, I. & Muthulingam, M. Detailed study on *Elaeocarpus ganitrus* (Rudraksha) for its medicinal importance–a review. *Int. J. Curr. Sci*, **20(1)**, 16-30 (2017).
3) Aryal, P. Medicinal value of Elaeocarpus sphaericus: A review. *Asian J. Pharm.*, *6*(3), 15-21(2021).
4) Balamurugan, V., Sridhivya, M., Dharani, R., Selvakumar, S. & Vasanth, K. Phytochemical Screening, Antioxidant, Antidiabetic and Anticancer Activities of *Elaeocarpus* variabilis Fruit. *Turkish Journal of Agriculture-Food Science and Technology*, **10(8)**, 1352-1362 (2022).
5) Aishwarya B.L., Kundan W.N., Rajendra T.N., Rajendra W.P. et al. Scientific Research on Elaeocarpus Ganitrus (Rudraksha) for its Medicinal Importance. International Journal of Advanced Research in Science, Communication and Technology,**3(2)**,73-80 (2023).
6) Fang X, Phoebe Jr, C. H, Pezzuto J.M, Fong HH, Farnsworth, NR, Yellin B, & Hecht, SM. Plant anticancer agents, XXXIV. Cucurbitacins from Elaeocarpus dolichostylus. Journal of Natural Products, **47(6)**, 988-993(1984).
7) Sen D.J. Chemistry of bioelectric energy of rudraksha (*elaeocarpus ganitrus*): the spiritual protective energizer from evil power. European Journal of Biomedical and Pharmaceutical sciences,**4(10)**,1-28 (2017).
8) Anil Kumar, Sukhraj Punar, Lakha Ram, Ravi Sharma, Ashok K. Kakodia, Bina Rani, Upma Singh, Raaz K. Maheshwari. A Comprehensive Review on Phytochemical, Pharmacological, Dielectric and Therapeutic Attributes of Multifarious Rudraksha (Elaeocarpus Ganitrus Roxb.). European Journal of Applied Sciences, **9 (1)**, 97-109 (2021).
9) Singh, RK, & Nath G. Antimicrobial activity of Elaeocarpus sphaericus. *Phytotherapy research : PTR*, ***13*(5)**, 448–450 (1999).
10) Singh B, Chopra A, Ishar MP, Sharma A, Raj T. Pharmacognostic and antifungal investigations of Elaeocarpus ganitrus (Rudrakasha). Indian J Pharm Sci, **72(2)**,261-5. (2005).
11) *Gaurav Kumar, Loganathan Karthik, Kokati Venkata Bhaskara Rao. A Review on Medicinal Properties of Elaeocarpus ganitrus Roxb.ex G. Don. (Elaeocarpaceae).* Research J. Pharm. and Tech,**7(10)**, 1184-1186 (2014)
12) Freitas de LF, Alves BC, Andrea LCC, Cristina Teixeira DM. Janet sanjinez-argandoña E evaluation of nutritional composition, bioactive compounds and antimicrobial activity of Elaeocarpus serratus fruit extract. African Jour Food Sci,**1(3)**,30-37(2019).
13) E, J., R, V., & T, J. Z. Quality of dry ginger (Zingiber officinale) by different drying methods. Journal of food science and technology, **51(11)**, 3190–3198(2014).
14) Prajapati K, Thapaliya, S, Dhakal, D, Acharya, S, Shrestha, S, Hora, R, and Sakha, H. Antimicrobial Activity of Ethanolic Extract of Medicinal Plants against Human Pathogenic Bacteria. Tribhuvan University Journal of Microbiology ,**5(2)**, 1-6 (2018).
15) Manoharan, V., Arun Kumar, S., Arumugam, S. B., Anand, V., Krishnamoorthy, S., & Methippara, J. J. Is Resin Infiltration a Microinvasive Approach to White Lesions of Calcified Tooth Structures? A Systemic Review. International journal of clinical pediatric dentistry, **12(1)**, 53–58(2019).

16) Adejumo, OA, Ogundele, OA, Madubuko, CR, Oluwafemi, RO, Okoye OC, Okonkwo, KC, et al. Perceptions of the COVID-19 vaccine and willingness to receive vaccination among health workers in Nigeria. *Osong public health and research perspectives*, **12(4)**, 236–243(2021).
17) Dubey A., Ghosh N.S., Saxena G.K., Purohit D. and Shweta S., Management implications for neurotoxic effects associated with antibiotic use, Neuro Quantology, **6(20)**, 304-328 (2022)
18) Dubey A., Ghosh N.S., Rathor V.P.S., Patel S., Patel B. and Purohit D., Sars- COV-2 infection leads to neurodegenerative or neuropsychiatric diseases, International Journal of Health Sciences, **6(S3)**, 21-84 (2022)
19) Dubey A., Ghosh N.S. and Singh R., An in-depth and in vitro evaluation of the antioxidant and neuroprotective activity of aqueous and ethanolic extract of Asparagus racemosus Linn seed, Res. J. Chem. Environ, **27(10)**, 46-66 (2023)
20) Dubey A., Ghosh N.S. and Singh R.S., Effects of aqueous and ethanolic seed extract of Asparagus racemosus Linn on neurobehavioral pattern of acrylamide induced experimental Zebra fish, Res. J. Biotech., **18(11)**, 81-88 (2023)
21) 21. Dubey A., Ghosh N.S. and Singh R.S., Role of Aqueous and Ethanolic Seed Extract of Asparagus racemosus on Acr- Induced Neurotoxicity in Adult Zebrafish: Emergence of Neuroprotective Results, Egyptian Journal of Aquatic Biology & Fisheries, **27(6),** 285-296 (2023)
22) Hule AK, Shah AS, Gambhire MN, Juvekar AR. An evaluation of the antidiabetic effects of Elaeocarpus ganitrus in experimental animals. Indian J Pharmacol,**43(1)** ,56-9(2011).
23) Tripathi Y, Shukla, P. & Tiwari, D. Phytochemical evaluation and antihyperglycemic effects of Elaeocarpus ganitrus Roxb (Rudraksha) in Streptozotocin Induced Diabetes. Int. J. Pharm. Pharm. Sci, **7(1)**, 280-283(2015).
24) Rao KS, Rao OU, Aminabee S, Rao C, & Rao AL. Hypoglycemic and antidiabetic potential of chitosan aqueous extract of Elaeocarpus ganitrus. International journal of research in pharmacy and chemistry, **2(2)**, 428-441(2012).
25) Keerthana M, & Chitra P. Antidiabetic activity of chemical constituents in Elaeocarpus tectorius fruits-an in-silico study. J. Univ. Shanghai Sci. Technol, **2(1)**, 342- 358 (2020).
26) Dadhich A, Jasuja ND, Chandra S, & Sharma G. Antidepressant effects of fruit extract of Elaeocarpus ganitrus in force swim test. International Journal of Pharmaceutical Sciences and Research, **5(7)**, 2807(2014).
27) Bhattacharjee, SK. Handbook of medicinal plants: Aavishkar Publishers (2000).
28) Kakalij RM, Alla P, Kshirsagar RP, Kumar B H, Mutha S.S. & Diwan PV.Ameliorative effect of Elaeocarpus ganitrus on gentamicin-induced nephrotoxicity in rats. Indian J Pharmacol. **46(3)**, 298- 302(2014).
29) Singh RK, Bhattacharya SK. & Acharya SB. Studies on extracts of Elaeocarpus sphaericus fruits on in vitro rat mast cells. Phytomedicine, **7(3)**, 205-207(2000)
30) Garg K, Goswami K, & Khurana G. A pharmacognostical review on Elaeocarpus sphaericus. Int. J. Pharm. Pharm. Sci, **5(1)**, 3- 8 (2013).
31) Singh RK, Bhattacharya, SK, & Acharya SB. Studies on extracts of Elaeocarpus sphaericus fruits on in vitro rat mast cells. Phytomedicine, 7(3), 205-207(2000).
32) Shiva Sharma *et al*. Electrical behavior of plant-based material. Materials today Procedding, **5(2),** 349-354 (2018).