Detailed study on *Elaeocarpus ganitrus* (Rudraksha)

for its medicinal importance - A review

Iyyappan Arivu* and Minnady Muthulingam

Department of Zoology, Faculty of science, Annamalai University, Chidambaram-608 002, Tamil Nadu, India

*Corresponding author: arivubharathi@rediffmail.com

Abstract

*Elaeocarpus ganitrus* commonly known as Rudraksha in India belongs to the *Elaeocarpaceae* family and grows in the Himalayan region. *Elaeocarpus ganitrus* has an important position in Hindu religion and in Ayurveda, the ancient Indian system of medicine. *Elaeocarpus ganitrus* commonly known as Rudraksha in Sanskrit and Rudraki in Hindi is grown in Himalayan region in India for its medicinal properties and attractive fruit stones. The seed of Rudraksha has been given an individual place and it is attributed with numinous and heavenly properties. Rudraksha beads have been traditionally used in India and other Asian countries. As stated by Ayurveda system of medicine, wearing Rudraksha beads relieves strain, anxiety, lack of concentration, insomnia, depression, hypertension, palpitation, infertility, rheumatism, and asthma. Present investigation as a review has been attempting to make the collections of the details like botanical, ethnomedicinal, pharmacological information and therapeutic potential of *Elaeocarpus ganitrus* on the basis of recent scientific research.

Introduction

Botanical classification

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Order: Oxalidales

Family: Elaeocarpaceae

Genus: *Elaeocarpus*

Species: *E. ganitrus* / *Sphaericus*

Binomial name: *Elaeocarpus ganitrus* (Roxb.)

Common name: Rudraksha

Origin and distribution of *Elaeocarpus ganitrus*

Origin and distribution Rudraksha botanically called *Elaeocarpus ganitrus* raise in tropical and subtropical regions at the eminence ranging from seacoast to 2,000 meters above the sea level. Rudraksha cultivate in the area from the Gangetic Plain in foothills of the Himalayas to South-East Asia, Indonesia, and New Guinea to Australia, Guam, and Hawaii. Rudraksha tree flourish on mountains and hilly region of Nepal, Indonesia, Java, Sumatra and Burma (Koul, 2001). Bhuyan et al. (2002) reported the Tree of Rudraksha is common along the foothills of all districts of Arunachal Pradesh, except tawang and upper subansiri and some other high-altitude areas. Tree of Rudraksha is originated in humid evergreen forests, which are characterized by three-tier forest structure.
**Cultivation**

Rudraksha farming is a difficult process due to the slow sprouting from the beads. Depending on the humidity of the soil, it usually takes 1-2 years for a tree to sprout. Rudraksha is grown in subtropical climate region with temperature ranges from 23-25 degree centigrade. The tree starts giving fruit after 7 years and period. A single rudraksha tree bears beads in all different faces or mukhis at the same time. The higher mukhis or faces are very rare. Most common rudraksha bead is five faceted or Punchmukhi. The environment and location of rudraksha tree plays a major role in the bead formation and the type of bead formed (e.g.) The Himalayan beads seems larger, heavier and more powerful due to the environment they grow in. In the single tree Rudraksha tree comes in different faces at the same time but higher mukhis faces are very rare. The Himalayan beads simply seems to be larger, heavier and more powerful due to the environment they grown in. So, it is a certainty that environment and specifically the location of rudraksha trees play a key role in their growth (www.rudrakshanepal.com).

![Fig. 1. Morphology of Rudraksha](image)

**Conservation status in India**

As per recent studies, the population of the rudraksha tree in India is dwindling at an alarming rate. The decrease in the population is mainly attributed to the over-exploitation of the species and also, to the large-scale disturbances in their habitats. The tree reproduces by means of seeds. The increased seed collection by local people has resulted in the shrinkage of the natural seed bank in the soil. This in turn has adversely affected the regeneration of the species. Thus, 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 (Khan et al., 2004).

**Phytochemistry**

Rudraksha contains indolizidine type of Alkaloids. The indolizidine alkaloids display a wide range of biological activities and have been the subject of numerous synthetic studies (Michael, 1997). It also contains minerals, vitamins, steroids, flavanoids. Aqueous extract of leaves contains glycides also. Ethanolic extract of leaves contains gallic acid, ellagic acid and quercetin. Rudraksha contains indolizidine type of Alkaloids. Indolizidines are widely distributed in nature-in plants as well as in many animals. Their structures can be described either as derivatives of the aromatic bicyclic indolizine or as azabicyclo nonanes. The indolizidine alkaloids display a wide range of biological activities and have been the subject of numerous synthetic studies (Michael, 1997). It also contains minerals, vitamins, steroids, flavanoids. Aqueous extract of leaves contains glycides also. Ethanolic extract of leaves contains gallic acid, ellagic acid and quercetin.

Seven isomeric alkaloids of molecular formula, $C_{16}H_{21}NO_2$, have been isolated from the leaves of *Elaeocarpus sphaericus* (Gaertn.) K. Schum. Two of the alkaloids are identical ($\cdot$)-isoelaeocarpiline and...
(+)-elaeocarpiline previously isolated from *E. dolichostylis*. The other alkaloids are Elaeocarpidine, (+)-Elaeocarpine, (+)-Isoelaeocarpin, Isoelaeocarpidine, Rudrakine (Ray et al., 1979). Study has been made of the alkaloids obtained by sodium borohydride reduction of some isomeric alkaloids (Johns et al., 1971). The structures and absolute configuration of seven alkaloids isoelaeocarpiline and elaeocarpiline and five new alkaloids have been determined (Johns et al., 1970). A cyanogenic glycoside-6′-O-galloylsambunigrin has been isolated from the foliage of the Australian tropical rainforest tree species *Elaeocarpus sericopetalus* F. Muell. (Elaeocarpaceae). This is the first formal characterisation of a cyanogenic constituent in the Elaeocarpaceae family, and only the second in the order Malvales. 6′-O-galloylsambunigrin was identified as the principal glycoside, accounting for 91% of total cyanogen in a leaf methanol extract.

Preliminary analyses indicated that the remaining cyanogen content may comprise small quantities of sambunigrin, as well as di- and trigallates of sambunigrin. *E. sericopetalus* was found to have foliar concentrations of cyanogenic glycosides among the highest reported for tree leaves, up to 5.2 mg CN g\(^{-1}\) dry wt. A cyanogenic glycoside-6′-O-galloylsambunigrin has been isolated from foliage of the highly cyanogenic Australian tropical rainforest endemic *Elaeocarpus sericopetalus* (Elaeocarpaceae). This is the first published characterisation of a cyanogenic glycoside in the family Elaeocarpaceae (Stewart et al., 2006). Five new indolizidine alkaloids, grandisines C, D, E, F, and G, and one known indolizidine alkaloid, (−)-isoelaeocarpiline, were isolated from the leaves of *Elaeocarpus grandis* and their structures determined by 1D and 2D NMR spectroscopy. Grandisine C (4) is isomeric with the known compound rudrakine (1). The absolute configuration of grandisine D was deduced by its conversion to (−)-isoelaeocarpiline. Grandisine E (6) contains a novel tetracyclic ring system. Grandisine F is the 14-amino analogue of grandisine C. Grandisine G contains the novel combination of a piperidine attached to an indolizidine. Grandisines C, D, F, and G and (−)-isoelaeocarpiline showed receptor binding affinity for the human δ-opioid receptor with IC\(_{50}\) values of 14.6, 1.65, 1.55, 75.4 and 9.9 μM respectively (Katavic et al., 2006).

**Ayurvedic properties and medicinal value of Rudraksha**

Ayurveda refers to this wonderful bead and gives details of rudraksha for strengthening body constitutions. The beads of rudraksha, its bark and leaves all are used to cure various ailments like mental disorders, headache, fever, skin diseases etc. Rudraksha may be worn either on wrist, arm or other parts of the body. As a blood purifier: Rudraksha shall be used for treating the blood impurities and strengthens the body substance. As antibacterial: Rudraksha can be used for treating the burns and marks. It can also be used for curing cough and breathing problems. For blood pressure: Rudraksha can be used to treat high blood pressure, heart diseases etc. As cosmetic product: Rudraksha can be used in cosmetics to bring skin glow, also brings in a charming face. For improving memory power:
Rudraksha can be used for improving memory power when taken with milk. For all brain diseases: Rudraksha can be used for treating all brain diseases like brain fever etc. For controlling epilepsy: By using pulp of Rudraksha fruit or bark, can be used for controlling epilepsy. For curing liver related problems, jaundice, and stomachache: Rudraksha can be used for treating stomach pain and liver problems. Modern science has shown that the electromagnetic nature of rudraksha beads affect our neurophysiology in a specific manner that allows control of heart beat, blood pressure, stress levels, hypertension and at the same time relieves anxiety, depression and neurotic condition. Rudraksha can be used even for the treatment of chronic diseases like cancer either used externally by wearing it or an oral administered by drinking milk of rudraksha beads boiled in it and taking the finest dust of rudraksha mixed with water and different mukhi dust are used for different diseases (http://www.rudraksha-ratna.com and file://e:\Rudraksha.htm).

**Antiulcerogenic, Analgesic and Anti-inflammatory activity**

Ethanolic extract of the fruits of *Elaeocarpus ganitrus* shows analgesic activity (Bhattacharya et al., 1875) at a dose of 100 mg/kg i/p (Almeida et al., 2004). Analgesic and Antiinflammatory potentials of different extracts (petroleum ether, chloroform, methanol and aqueous) of *Elaeocarpus sphaericus* leaves have been evaluated by using tail flick tests in mice and carrageenan-induced paw oedema (inflammation) in rats respectively. The methanol and aqueous extract of *Elaeocarpus ganitrus* leaves at all doses (50, 100, 200 mg/kg) showed significant percentage inhibition of oedema at 3rd hrs of treatment when compared with control group but maximum percentage inhibition of oedema at dose 200 mg/kg (i.e. 46.21 and 41.66%) for both extracts. Analgesic activity was also confers by significant increase in tail flick response with the methanol and aqueous extract of *Elaeocarpus ganitrus* leaves at 100 mg/kg concentration. Methanolic and aqueous extract of *E. sphaericus* leaves at dose 200 mg/kg showed inhibitory effect on carrageenan induced inflammation. It may be due to inhibition of the enzyme cyclooxygenase leading to inhibition of prostaglandin synthesis (Nain et al., 2012). Prostaglandins (PGs) participate in the development of the second phase of inflammatory reaction which is measured at 3 rd hr (Nain et al., 2012). Antiulcerogenic Different extracts (petroleum ether, benzene, chloroform, acetone, and ethanol) of dried *Elaeocarpus sphaericus* fruit also shows antiulcerogenic activities in rats (Singh et al., 2000). **Antioxidant activity**

*In vitro* antioxidant activity of ethanolic extract of *Elaeocarpus ganitrus* leaves was evaluated for their total antioxidant capacity, metal chelating, reducing power, hydroxyl radical scavenging and ABTS+ (2, 2-azinobis-(3-ethylbenothiazoline-6-sulphonate) radical scavenging activities. Maximum iron chelating activity (76.70%) was observed at 500 µg/ml extract concentration followed by the scavenging of the ABTS+ radical (55.77%) at the same concentration. However, the extract demonstrated only moderate hydroxyl radical scavenging activity (13.43%). Total antioxidant capacity was detected to be 24.18 mg ascorbic acid
equivalents at 500 µg/ml extract concentration. Recent studies have shown that various flavonoids and related polyphenols confer substantially to the total antioxidant activity of many plants (Luo et al., 2002). Total phenolic content in *Elaeocarpus ganitrus* was detected to be 56.79±1.6 mg gallic acid equivalents/g of dry material. Total flavonoids in *Elaeocarpus ganitrus* were detected to be 18.58±0.3 mg rutin equivalents/g of dry material. These findings recommend 85% of the antioxidant capacity of *Elaeocarpus ganitrus* is by virtue of phenolics and flavonoid components. Moreover, enzymatic and other non-enzymatic antioxidants may be contributed to antioxidant potential (Bharati kumar et al., 2008).

**Anti-diabetic activity**

The chitosan based extract as well as aqueous extract of *Elaeocarpus ganitrus* have been studied for antidiabetic activity in rats. It was observed that chitosan based *Elaeocarpus ganitrus* leaf extract stimulated hypoglycaemic action on normal rats. By virtue of antioxidant potential of taken extract they can relieve the stress induced through hyperglycaemia (Bharati kumar et al., 2008). Due to chitosan, insulin secretion of pancreatic cells could be stimulated, overgrowth of cells and isolated pancreatic islet cells improved, disorders of glucose tolerance decreased and disposed (Bing et al., 2007). The % decrease in blood glucose in case of the chitosan based aqueous extract at a dose of 200 mg/kg was as good as with that of standard antidiabetic drug glimeperide 20 mg/kg. More reduction in blood glucose was observed in diabetic rats when compared to normal rats administered with the same dose. The study illustrates marked antidiabetic activity of *Elaeocarpus ganitrus* in diabetic rats. The chitosan based extract enhanced the antidiabetic potential of *Elaeocarpus ganitrus* evidently manifests synergy (Rao et al., 2012). Similarly Geetha et al. (2016) investigated the anti-diabetic activity of *Elaeocarpus ganitrus* fruit in streptozotocin-induced diabetic rats. The dose-dependent effects of 30 days oral treatment with ethanol extracts of fruit of *Elaeocarpus ganitrus* on body weight, blood glucose level, total protein, albumin, liver marker enzymes and carbohydrate metabolizing enzymes were evaluated in streptozotocin induced diabetic rats. Oral administration ethanolic extract of fruit of *Elaeocarpus ganitrus* showed significant restoration of the body weight and decrease in the blood glucose level, liver marker enzymes and carbohydrate metabolizing enzymes were observed in diabetic rats. These results suggest that fruit extract of *Elaeocarpus ganitrus* has valuable anti-diabetic activity in STZ-induced diabetic rats.

Amolkumar et al. (2011) evaluated antidiabetic effects of the aqueous extract of *Elaeocarpus ganitrus* in experimental animals. This results showed in normoglycemic rats *Elaeocarpus ganitrus* showed a significant hypoglycemc effects at 24 hours on STZ-induced diabetic rats, the *Elaeocarpus ganitrus* treatment significantly decreased the blood glucose levels in a dose dependent manner. In the acute oral toxicity study *Elaeocarpus ganitrus* showed no mortality till the 5 g/kg dose in mice, therefore these investigation shows that *Elaeocarpus ganitrus* seeds has potential antidiabetic effects. The effect of chitosan based extract of *Elaeocarpus*
ganitrus on blood glucose levels in diabetic rats was found to higher to that of normal rats. However, variation in percentage reduction was noticed. Since the selected extract posses antioxidant activity and Chitosan could increase insulin secretion of pancreatic cells and improve the overgrowth of cells and isolated pancreatic islet cells, decrease and normalize the disorders of glucose tolerance (Bing et al., 2007).

Water extract of Elaeocarpus grandiflorus was investigated for alloxan induced diabetes. Leaves, fruits and twigs of the plant were weighed and boiled with distilled water. Then water extract was filtered and freeze dried. A freshly prepared solution of alloxan (120 mg/kg of body weight) in 0.9% NaCl was S/C injected to 24 hrs fasted rats. After 24 hrs blood glucose was measured using glucostrip read on a glucometer. The animals were divided in to seven groups of 5 rats each. The first three groups were, normal control rats orally receiving distilled water, normal control rats orally receiving the extract 0.01 g/kg of body weight and diabetic rats orally receiving distilled water. The other four groups were diabetic rats I/P injected with insulin (6 µ/kg) and diabetic rats orally receiving the extract at the doses of 0.0001, 0.001 or 0.1 g/kg of body weight. The treatment was performed daily for 30 days. After this it is concluded that E. grandiflorus water extract possess a hypoglycemic effect (Bualee et al., 2007).

Antimicrobial activity

Antimicrobial in vitro antimicrobial activity of aqueous extract of Elaeocarpus ganitrus leaves was tested against clinical isolates of bacteria and fungi. The extract exhibited extensive antimicrobial action as it showed growth inhibition for Bacillus cereus, Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, Klebsiella pneumoniae, Aspergillus flavus, Penicillium sp, Candida albicans and C. tropicalis. Agar well diffusion method is used for determining antibacterial activity of the crude extracts (Kumar et al., 2010). Aqueous extract of Elaeocarpus ganitrus leaves was screened for antibacterial activity against three gram positive (B. cereus, S. aureus, and M. luteus) and three gram negative bacteria (P. aeruginosa, E. coli and K. pneumoniae), isolated from the clinical samples. The extract exhibited excellent antibacterial activity against all the bacterial cultures, except M. luteus. Antifungal activity of the crude extracts was examined through the agar well diffusion method (Kumar et al., 2010). Antifungal activity of the extract was evaluated against three molds (Penicillium sp, A. niger and A. flavus) and two yeast (C. albicans and C. tropicalis), isolated from clinical samples. Extract exhibited antifungal activity against all the fungal cultures except A. niger. Antimicrobial activity of Elaeocarpus ganitrus leaves extract was compared with the antimicrobial activity of standard drugs for evaluating relative percentage inhibition. The aqueous extract of Elaeocarpus ganitrus leaves exhibited maximum relative percentage inhibition against B. cereus (124.16%) and Penicillium sp. (88.26%) for bacteria and fungi respectively. Minimum inhibitory concentration values of the extract varied from 125-2000 µg/ml; however, minimum value was reported against B. cereus and A. flavus (125 µg/ml). The results indicate the potential use of Elaeocarpus ganitrus leaves for the
development of antimicrobial compounds (Rao et al., 2011). Earlier, experiments were performed with various extracts (Petroleum ether, benzene, chloroform, acetone and ethanol) of dried E. sphaericus fruit. The extracts have been recited to exhibit a broad spectrum of antimicrobial action against a variety of gram positive and gram negative bacteria (Singh and Nath, 1999). *Elaeocarpus ganitrus* is a less explored source of immensely useful antimicrobial constituents and it is worth for prospective experimental investigation. Further, the active principle can be isolated and the mechanism of antimicrobial activity can be studied using advance scientific techniques.

Traditionally the fruit of *Elaeocarpus ganitrus* used to treat various ailments. The flesh or pulp of drupe is green and fresh state which is sour in taste that stimulates appetite and is given in epilepsy, diseases of the head and mental illness. The fruit stone (seed kernel) is sweet, cooling and emollient. Externally the stone (fruit or drupe) is rubbed with water (like sandalwood) and then it is applied to small-pox eruptions. Similarly, it is applied on organs having burning sensation and in other conditions (i.e.) eruptions, measles and fevers (Balbir et al., 2013). Antibacterial activity of petroleum ether, benzene, chloroform, acetone and ethanol extracts of dried *Elaeocarpus sphaericus* fruit was investigated against 28 gms +ve and gram –ve bacteria using the disc diffusion and plate dilution methods. The acetone fraction showed marked antimicrobial activity against ten organisms. Benzene was active against *Salmonella typhimurium* and *Morganella morganii*, and ethanol extract against *Plesiomonas shigelloides, Shigella flexnerri* and *Sh. sonneii*. The alkaloids and flavonoids present in the plant appear to be of chemotherapeutic interest. Leaves of *Elaeocarpus serratus* also showed significant antibacterial activity against some pathogenic bacteria. It is a medium to big sized tree with simple leaves and small flowers. Fruit juice of this plant has been used in treatment of diarrhea and dysentery (Shazid et al., 2010).

**Antidepressant effect**

Bhattacharya et al. (1975) studied Pharmacological investigations with the water soluble 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. Dadhich et al. (2014) studied that the ethanolic fruit extract of *Elaeocarpus ganitrus* had significant antidepressant effects in mice. Different doses of the extract were administered to mice. Low doses were able to reduce immobility and to enhance active behaviors (i.e.) climbing, simultaneously. However, the effect of
high dose on immobility and climbing were decreased. This effect is similar to the sedative effect which is shown by a reduction in general motor activity. There may be three major reasons for this effect. The first reason may be due to interference of the phytoconstituents present in the extract with its antidepressant effect. Second may be due to the lack of dose-dependent effect of the extract on immobility and climbing behaviors. The third reason might be the doses itself used in this study which may have reduced plasma levels of tryptophan, an essential amino acid that is used for the synthesis of serotonin.

**Anxiolytic activity**

Koirala (2007) studied incidence of pathologic anxiety in the community is very high and is associated with lot of morbidity. Lifetime prevalence in women is 30.5% and males 19.2%. Hence, it is very important to address the problem of anxiety and find effective remedies. Anxiolytic effect of Tensarin tablet in mice was determined. Tensarin tablet contains Jatamansi root (100 mg), Rauwolfia serpentine (100 mg), Acorus calamus rhizome (75 mg), Elaeocarpus ganitrus seed (75 mg), Withania somnifera rhizome (75 mg) and Tinospora cordifolia stem (75 mg). The powder was mixed with 0.5% carboxy methyl cellulose solution. The solution was administered orally with the help of orogastric tube. There were eight groups of ten animals each. The mice were tested only once after the completion of drug treatment. Overnight fasted animals were selected randomly on the day of experiment for administration of vehicle, standard drug and study drug. The animals were acclimatized one hour before for behavioral tests. One hour time interval between drug administration and behavioral tests was maintained. Tensarin (50-200 mg/kg) given for 7 days were observed to produce anxiolytic effects as indicated by an increase in rearing, number of crossing and time spent by animal in central square and it was also seen that there was significant decrease in step down latency, increase in step down error and time spent by animal in shock zone. It shows that Tensarin has some psychotropic effect in a dose dependent manner.

**Antihypertensive activity**

Hypertension is one of the leading causes of disability, mortality and mobility along the population. It is the most common chronic illness among the world faces (Akinkigbe, 2001; Schutte et al., 2003). Hypertension is the most common cardiovascular diseases and constituents a major factor for several cardiovascular pathologies including atherosclerosis, coronary artery diseases, myocardium infract, heart failure, renal insufficiency, stroke and dissecting aneurysm of aorta (Oparil, 1999). Aqueous extract of *Elaeocarpus ganitrus* Roxb. Seeds powder (Family Elaeocarpaceae) was evaluated for its antihypertensive activity in renal artery occluded hypertensive rats. Male wistor rats were pretreated with aqueous extract of *Elaeocarpus ganitrus* for 6 weeks. Hypertension was induced in animals by clamping the renal artery with renal bulldog clamp for 4 hrs. Ischemia of the kidneys causes elevation of blood pressure by activation of the rennin-angiotensin system. Elevated blood pressure of the animals was significantly decreased by the aqueous extract of *Elaeocarpus ganitrus* at the dose levels of 25, 50 and 100 mg/kg I/V. Captopril
angiotensin converting enzyme inhibitor at the dose of 1 mg/kg i/v showed significantly reduced in elevated blood pressure. The antihypertensive activity of aqueous extract of *Elaeocarpus ganitrus* may be due to the action of renninangiotensin system. Because of high incidence and morbidity, various drugs and regimes have been advocated for the control of hypertension. Many new drugs have been introduced which may demonstrate better efficacy but posses side effects. Recently attention has been focused towards herbal and mineral preparations which are traditionally used as potential therapeutic agents in the prevention and management of cardiovascular diseases (Bhatt et al., 1998).

**Hepatoprotective activity**

The extract of *Elaeocarpus ganitrus* was screened for its hepatoprotective activity in carbon tetrachloride induced liver damage in Wister albino rats. The extracts at dose of 250, 750 mg/kg were administered orally once daily. The substantially elevated serum enzymatic levels of serum glutamate oxaloacetate transaminase, serum glutamate pyruvate transaminase, serum alkaline phosphatase, total bilirubin, SOD and catalase were restored towards normalization significantly by the extracts. Silymarin was used as standard reference and exhibited significant hepatoprotective activity against carbon tetrachloride induced hepatotoxicity in rats. The results of this study strongly indicate that *Elaeocarpus ganitrus* have potent hepatoprotective action against carbon tetrachloride induced hepatic damage in rats (Anusha and Janarthan, 2014).

**Antiasthmatic activity**

Singh et al. (2000) reported the chloroform, acetone, petroleum ether, benzene, and ethanolic extracts of *Elaeocarpus ganitrus* fruits were found to have mast-cell stabilizing activity, substantiating the effectiveness of *Elaeocarpus ganitrus* in bronchial asthma. In another study, the petroleum ether, benzene, chloroform, acetone and ethanol extracts protected guinea-pigs against bronchospasm induced by acetylcholine aerosols and histamine (Hardainiyan et al., 2015).

**Antianxiety activity**

*Elaeocarpus ganitrus* was evaluated for antianxiety activity in mice using elevated plus maze model. The chloroform and ethanol extractives were shown effective against anxiety at all doses, but a dose of 200 mg/kg of ethanol extractive was at equality with that of diazepam as clear from statistical equivalence between the results of this dose and that manifested by diazepam. Chloroform extractives also effective at all doses but most effective at a dose of 400 mg/kg (Sing et al., 2012).

**Antimalarial and cytotoxic activity**

Malaria is a global public health problem and alarming spread of drug resistance and limited number of effective drugs now available underline how important it is to discover antimalarial compounds. By ethno pharmacological investigations 49 plants were identified, 228 extracts were prepared and tested for their *in-vitro* activity against *Plasmodium falciparum*, and assessed for any cytotoxicity against the human cancer cell line HeLa.
and the embryonic lung MRC5 cell line. In a first screening at a concentration of 10 μg/ml, 92 extracts from 46 plants showed antiplasmodial activity (parasite growth inhibition >30%). IC50 values of most active extracts were determined as well as their selectivity towards *P. falciparum* in comparison to cytotoxic effects against human cell lines. *Elaeocarpus kontumensis* Gagn. (*Elaeocarpaceae*) with IC50 value (0.4-8.6 μg/ml) showed a good antiplasmodial activity (Pouplin et al., 2007).

Different Type of Rudraksha with their Ruling God, Beej Mantra benefits, Planet and zodiac sign, Shape and Its Astrological Uses

<table>
<thead>
<tr>
<th>Type of Rudraksha</th>
<th>Ruling God</th>
<th>Beej mantra</th>
<th>Major benefits</th>
<th>Planet and Zodiac sign</th>
<th>Shape</th>
<th>Astrological Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Faced</td>
<td>Shiva</td>
<td>Om Hreem Nama, Om Namaha Shivaya</td>
<td>Chronic asthma heart problems, mental anxiety, T.B, paralysis, stroke, eye problem bone pain and head ache</td>
<td>Sun / Leo</td>
<td>Half moon shape</td>
<td>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</td>
</tr>
<tr>
<td>2 Faced</td>
<td>Ardhnareshwar</td>
<td>Om Namah, Om Shiva Shaktihi Namah</td>
<td>Impotency, renal failure, stress, anxiety, lack of concentration, depression, negative thinking, eye problems, mental chaos, hysteria and intestinal disorder</td>
<td>Moon/Cancer, Scorpio</td>
<td>Two natural lines or facets on its surface</td>
<td>Blesses the wearer with 'UNITY'. It could be related to guru-shishya, parents-children, husband-wife or friends. Maintaining oneness is its Peculiarity</td>
</tr>
<tr>
<td>3 Faced</td>
<td>Agni</td>
<td>Om Kleem Namha</td>
<td>Depression, schizophrenia, weakness multifarious, directive of menstrual cycle/menstrual stress, fixation/guilt induced complexes, blood pressure, mood swings, fever/weakness, jaundice and mental disability.</td>
<td>Mars/Aries, Cancer, Leo, Pisces</td>
<td>Three natural lines or mukhas on its surface</td>
<td>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</td>
</tr>
<tr>
<td>4 Faced</td>
<td>Brahma</td>
<td>Om Kleem Namha</td>
<td>Blood circulation, cough and brain linked illness, asthma, hesitate, memory lapse and respiratory strip problems.</td>
<td>Mercury/Ge mini, Virgo</td>
<td>Four lines on its surface</td>
<td>The wearer gains power of creativity when blessed. Increases memory power and intelligence</td>
</tr>
<tr>
<td>5 Faced</td>
<td>Kalaagni</td>
<td>Om Hreem Namah</td>
<td>Blood pressure, heart problems, stress, mental disability, fatness, anger management, diabetics, piles, neurotic and mal adjustment problems.</td>
<td>Jupiter/Aries, Scorpio, Pisces</td>
<td>Five natural lines (mukhas) on its surface</td>
<td>Wears health and peace. It increases memory also</td>
</tr>
<tr>
<td>6 Faced</td>
<td>Kartikeya</td>
<td>Om Hreem Hoom Namah</td>
<td>Epilepsy and gynecological problems</td>
<td>Venus/Taurus, Gemini, Virgo, Libra, Capricorn, Aquarius</td>
<td>Six natural lines (mukhas) on its surface</td>
<td>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</td>
</tr>
<tr>
<td>7 Faced</td>
<td>Mahalaxmi</td>
<td>Om Hoom Namah</td>
<td>Asthma, pharyngitis, impotency, foot related disease, respiratory and</td>
<td>Saturn/Taurus, Libra, Capricorn</td>
<td>Seven natural lines</td>
<td>It should be worn by those who are suffering from miseries pertaining to</td>
</tr>
</tbody>
</table>

Rudraksha oil

It is cold compressed 100% pure oil extracted from rudraksha seeds. It is used as a dietary supplement. Drink two drops of oil once a day for internal healing. It is also used as externally as hair oil daily, removes dandruff and acts as hair conditioner, reduces acne and pimplies. It also pacify skin condition such as eczema, ringworm removes itching and helps to heal faster. It is also used as bodies massage oil (Garg et al., 2013).
<table>
<thead>
<tr>
<th>Face Number</th>
<th>Name</th>
<th>Lines on Surface (Mukhas)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 Faced</td>
<td>Ganesha</td>
<td>8 natural lines</td>
<td>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.</td>
</tr>
<tr>
<td>9 Faced</td>
<td>Durga</td>
<td>9 natural lines</td>
<td>Wearer is blessed with lot of energy, powers, Dynamism and fearlessness, which are useful to live a life of success.</td>
</tr>
<tr>
<td>10 Faced</td>
<td>Vishnu</td>
<td>10 natural lines</td>
<td>This contains the influence of ten incarnations and the ten directions. It works like a shield on one's body and drives evils away.</td>
</tr>
<tr>
<td>11 Faced</td>
<td>Hanuman</td>
<td>11 natural lines</td>
<td>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.</td>
</tr>
<tr>
<td>12 Faced</td>
<td>Sun</td>
<td>12 natural lines</td>
<td>Wearer gets the quality of the sun – to rule and to move continuously with brilliant radiance and strength. Good for ministers, politicians, administrators, businessmen and executives. Removes worry, suspicion and fear. Increases self image and motivation.</td>
</tr>
<tr>
<td>13 Faced</td>
<td>Indra</td>
<td>13 natural lines</td>
<td>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.</td>
</tr>
<tr>
<td>14 Faced</td>
<td>Hanuman</td>
<td>14 natural lines</td>
<td>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.</td>
</tr>
<tr>
<td>15 Faced</td>
<td>Harisubhash Nath</td>
<td>15 natural lines</td>
<td>This represents Lord Pashupati and is especially beneficial for economic progress. Its possesor is neither bereft of wealth nor inflicted by any kinds of skin diseases.</td>
</tr>
<tr>
<td>16 Faced</td>
<td>Hari and Shankar</td>
<td>16 natural lines</td>
<td>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.</td>
</tr>
<tr>
<td>17 Faced</td>
<td>Lord Viswakarma</td>
<td>17 natural lines (Mukhas)</td>
<td>Regarded the best for peace and comfort in the family. If a man...</td>
</tr>
<tr>
<td>Faced</td>
<td>Name</td>
<td>Mantra</td>
<td>Meaning</td>
</tr>
<tr>
<td>-------</td>
<td>------</td>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>18</td>
<td>Bhairav</td>
<td>Om Namah Shivay</td>
<td>Mental harmonization and loss or power</td>
</tr>
<tr>
<td>19</td>
<td>Vishu narayan</td>
<td>Om Namah Shivay</td>
<td>Blood disorder and spinal disorder</td>
</tr>
<tr>
<td>Gauri Shankar</td>
<td>Shiva and Parvati</td>
<td>Om Shri Gauri Shankarey Namah</td>
<td>Sexual and behavioral disorders.</td>
</tr>
<tr>
<td>Ganesha Rudraksha</td>
<td>Ganesh</td>
<td>Om garbha Gauriya Namah</td>
<td>Gynecological disorders</td>
</tr>
<tr>
<td>Trijuti / tribhagi</td>
<td>Brahma</td>
<td>Om Namah Shivay</td>
<td>Internal and external body disorders</td>
</tr>
<tr>
<td>Ekamukhi Gol-Dhana Rudraksh</td>
<td>Lord Shiva</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Ekavimsh ati Rudraksha</td>
<td>Lord Shiva</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Nirakar Rudraksha</td>
<td>Lord Shiva</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Ekamukhi Rudraksha</td>
<td>Lord Shiva and Parvathi</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Rudraksha with Shiva lingam</td>
<td>Lord Shiva</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Rudraksha with OM</td>
<td>Lord Murugan</td>
<td>Om Hreem Hoom Namah</td>
<td>Epilepsy and gynecological problems</td>
</tr>
<tr>
<td>Saptavims hati Rudraksha</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pancha-Paramesh var Rudraksha</td>
<td>The Fiveheaded Lord Shiva (Panchanana)</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
<tr>
<td>Gauri Shankar Savar Rudraksha</td>
<td>Lord Shiva</td>
<td>Om Namah Shivay</td>
<td>-</td>
</tr>
</tbody>
</table>
Conclusions

The worldwide investigations are exposed that Elaeocarpus ganitrus (Roxb) having valuable essential phytochemicals like triterpenes, tannins like geraniin and 3', 4', 5'-trimethoxy geraniin, indolizidine alkaloids grandisines, rudrakine and flavonoids quercitin. Different bioactive extracts prepared from Elaeocarpus ganitrus roxb. It shown numerous healthpromoting effects in vitro and in vivo, such as antioxidant, anti-inflammatory, analgesic, antifungal, antimicrobial, antidiabetic, antioxidative, antihypertensive, antianxiety, antiasthmatic, hepatoprotective and antidepressant activities. Elaeocarpus ganitrus has been used lucratively in ayurvedic medicine for centuries many investigations are called for to be attempted towards more clinical trials to support its therapeutic use. Future studies could be directed to determine the active principle of the extracts and its mode of action in vitro and in vivo studies.

Acknowledgment

The authors grateful to Dr. R. Karuppasamy, Professor and Head, Department of Zoology, Dr. M. Muniyan, Assistant Professor in Zoology, Annamalai University for providing facilities.

References

Bualee C, Ounaroon A, Jeenapongsa (2007). Antidiabetic and long terms effects of


http://www.kamalkapoor.com/rudraksh/medicinal-value-of-rudraksha.asp as
http://www.rudraksha-ratna.com


Luo XD, Basile MJ, Kennelly EJ (2002). Polyphenolic antioxidants from the fruits of
Arivu and Muthulingam, 2017


www.rudrakshanepal.com