

Antidepressant and Antibacterial Activity of *Elaeocarpus Ganitrus* Seed (Rudraksha)

Subhashish Tripathy^{*1}, Anil Middha² & Sudhansu Ranjan Swain³
Dept. Pharmaceutical Science OPJS University¹⁻², Churu, Rajasthan- India
Moradabad Educational Trust Group of Institutions, Faculty of Pharmacy³, Moradabad
Ylrededores, India

Abstract: The present study was aimed to investigate the antidepressant activity of Ethanolic extract of Seeds of *Elaeocarpus Ganitrus* (Rudraksha) at 250mg/kg dose in mice and study antibacterial potential by Disc diffusion method. Antidepressant activity of Ethanolic extract of *Elaeocarpus Ganitrus* was carried out using hole cross test, open field test and thiopental induced sleeping time test in Swis albino mice on the other hand for determination of antibacterial activity the extract was tested against two gram positive and five gram negative bacteria at three concentration (220,330,550 µg/Disc) through disc diffusion method. The Extract increase the loco motor activity of misc in open field and hole cross test significantly ($p < 0.05$) and in disc diffusion method the Zone of inhibition ranges from 6 to 12 mm and highest zone of inhibition is 12mm for *Escherichia Coli* at 550 µg/Disc. The finding demonstrate that the seed extract of *Elaeocarpus Ganitrus* have significant antidepressant activity and moderate antibacterial activity.

Introduction:

Elaeocarpus ganitrus usually known as Rudraksha in India belongs to the Elaeocarpaceae family, and grows in the Himalayan region. According to Hindu mythology, Rudraksha beads bear a huge religious, spiritual, and materialistic meaning. The Hindu mythology considers Rudraksha as symbol of link between earth and heaven. It is believed that it contains the secrets of evolution of entire universe within itself¹⁻². The entire human body acts as if a complex bio-electric circuit consisting of nervous system and other organs. A amount of electrical impulses are generated in the human body because of incessant heart beats, blood circulation, and conduction of sensory and motor impulses in nerves, contraction and relaxing of muscle fibers.

The fruits of this plant possesses amazing medicinal property and have been used in Ayurvedic traditional medicine for the treatment of mental diseases, epilepsy, asthma, hypertension, arthritis and liver diseases. As per Ayurvedic system of medicine, wearing *Rudraksha*

beads relieves strain, insomnia, anxiety, lack of concentration, depression, palpitation, hypertension, rheumatism, infertility and asthma. It has also anti-aging effect. Different pharmacological research proves that it has activities viz., analgesic, antifungal, Anti-inflammatory, antimicrobial, antidiabetic, antioxidative, antiviral, antitumor, antihypertensive, Antianxiety and antidepressant property²⁻³.



Fig. *Elaeocarpus ganitrus* bead Rudraksha

World Health Organization estimated that about 80% of the world population depends on traditional medicine for primary health care in which plants are the main source of medicine⁶. Plants are the important source of modern pharmaceutical drugs; nearly 25% of the pharmaceutically important drugs prescribed worldwide are derived from plants⁴⁻⁵. The aims of the study were to further explore the antidepressant and antibacterial activity of the Ethanolic extract of Seeds of *Elaeocarpus Ganitrus* (Rudraksha)

Material and Methods:

Plant material

Genuine *Elaeocarpus Ganitrus* bead Rudraksha were collected from online seller through EBay India in 2016 and further authenticated by X-Ray, water dipping technique.

Extracts and Preparation

The collected seed were washed thoroughly water and air dried for a week at 35-45⁰C & pulverized in electric grinder. The power obtained was successively extracted in ethanol (55-60⁰C).The

extracts were made to dry by using rotary evaporator under reduced pressure⁶⁻⁷.

Animals

Swiss albino mice having weight 25-35gm were collected from M.P.C.P animal house. The animals were housed under standard laboratory condition (Relative Humidity 55-65% room temperature $25.0 \pm 2^{\circ}\text{C}$ and 12h light dark cycle) and acclimatized for 7days. The animals were fed with standard diet and water.

Test organism

The bacterial strains used for the experiment were collected as pure culture from the well equipped microbiology lab of department of pharmacy, Maharana Pratap College of Pharmacy Kanpur, UP.

Antidepressant Activity

Hole Cross Test

The test was observed by the method use for screening sedative activity in mice. The animal were classified into three groups –control, positive control and test. The test groups received Ethanolic extract of *Elaeocarpus Ganitrus* seeds at the dose of 250mg/kg body weight orally where as the control group received vehicle (1% Tween 80 in water). The cage was partitioned by a steel plate at middle of a cage having assize of 30 x 20 x 14 cm. A hole of 3.5cm diameter was made at a height of 7.5 cm in the center of the cage. The no of passage of a mouse through the hole from one chamber to other was counted for a period of 3min on 0,30,60,90 and 120 min after the oral treatment with the test drugs⁸⁻¹⁰. Diazepam was used as a reference standard at the dose of 1mg/kg (I.P).

Open Field Test

The experiment was carried out according to method mention in the reference. The open field apparatus was constructed of white plywood and measured 72 x 72 cm with 36 cm walls. One of the walls was clear Plexiglas, so mice could be visible in the 2 apparatus. Blue lines were drawn on the floor with a marker and were visible through the clear Plexiglas floor. The floor of an open field of half square meter was divided into a series of square each alternatively colored black and white. The apparatus had a wall of 40cm height. The no of squares visited by the mice was counted for 3min on 0, 30, 60, and 120 min during the study period¹¹⁻¹³.

Thiopental sodium induced sleeping Time test

The animals were randomly divided into three groups consisting of five mice each. The test group received ethanol extract of Seeds of *Elaeocarpus Ganitrus* (Rudrakasha) at 250 mg/kg (p.o) and control group with vehicle (1% Tween 80 in water). Twenty minute later, thiopental sodium (40 mg/Kg, I.P) were administrated to each mouse to induce sleep. The animals were observed for the latent period (time between thiopental sodium administrations to loss of righting reflex) and duration of sleep i.e. time between the loss and recovering of righting reflex¹⁴⁻¹⁵.

Antibacterial assay

In vitro antibacterial screening in most of time by disc diffusion method for primary selection of the compounds as therapeutic agent. This method is highly effective for rapidly growing microorganisms and the activities of the test compound are expressed by measuring the diameter of zone of inhibition. In this method the compounds are applied to the agar medium by using paper discs (.This method is essentially a qualitative or semi quantitative test which allow allows classification of microorganism as susceptible, intermediate or resistance to the test material as well as bacteriostatic or bactericidal activity of a compound¹⁶⁻¹⁸. The diameters of the zone of inhibition produced by the compound at the concentration 220,330 & 550 $\mu\text{g/Disc}$ were compared with the standard antibiotic (Kanamycin, 30 $\mu\text{g/Disc}$).

Statistical analysis

Data are exposed as mean \pm STD and were analyzed statistically by one-way ANOVA procedures, followed by using Turkey's test. A difference was considered significant at $P < 0.05$.

Results

Antidepressant Activity

Hole cross test

The number of hole crossed from one chamber to another by mice of the control group was similar from 0 to 120 min (Table 1). In hole cross test, the extracts showed an increase in movement in test animals from the second observation period as evident by the augmentation of number of hole crossed by the treated mice compared to control group. The result was compared to the reference drug diazepam and was statistically significant ($P < 0.05$).

Table-1 Antidepressant activity of Ethanolic extract of *Elaeocarpus Ganitrus* (EEEG) on hole cross test in mice

Group	Treatment	Dose route	Numbers of movements				
			0 min	30min	60min	90min	120min
control	1% tween 80 in water	10mg/kg, p.o	17.82. ± 0.89	16.20±0.78	14.25±1.202	15.84±1.202	15.0±0.883
Standard	Diazepam	1 mg/kg, p.o	13.00±1.135*	6.20±1.528*	4.30±0.54*	3.58±0.43*	1.40±0.36*
Test	EEEG	250mg/kg, p.o	10.50±0.87*	14.00±1.155*	20.0±2.242*	18.82±1.892	16.45±0.43*

All values are expressed as mean±SEM (N=5); ONE Way Analysis of Variance (ANOVA) followed by Turkey's test. *P<0.05,significant compared to control

Open field test (OFT)

(OFT) is a technique generally used commonly in qualitative and quantitative measure of general loco motor activity in rodents. In (OFT) the number of

squares travelled by mice was enhanced significantly in the test group from 2nd observation compared to the control group. This increase number of squares travelled by the mice indicates the antidepressant activity of Ethanolic extract.

Table-2 Antidepressant activity of Ethanolic extract of *Elaeocarpus Ganitrus* (EEEG) on open Field test (OFT) in mice

Group	Treatment	Dose route	Numbers of movements				
			0 min	30min	60min	90min	120min
control	1% tween 80 in water	10mg/kg, p.o	67.	65.20±0.668	48.25±1.202	46.84±1.302	48.33±2.873
Standard	Diazepam	1 mg/kg, p.o	66.40±4.135	56.20±3.528	34.30±2.545*	19.75±0.842*	17.66±1.36*
Test	EEEG	250mg/kg, p.o	71.50±2.863	164.4	145.40±4.242*	123.82±4.892*	76.45±5.433*

All values are expressed as mean±SEM (N=5); ONE Way Analysis of Variance (ANOVA) followed by Turkey's test. *P<0.05,significant compared to control

Thiopental sodium induced sleeping Time test

For the thiopental sodium induced sleeping time test, the test group treated with the extract at 250mg/kg showed significant (P<0.05) and

increase in onset of action and decreased the duration of which means that the extract might have antidepressant effect. The extracts indicate more onset than control and diazepam and lower duration of sleep than control¹⁹.

Table-3 Antidepressant activity of Ethanolic extract of *Elaeocarpus Ganitrus* (EEEG) on Thiopental sodium induced sleeping Time test in mice.

Group	Treatment	Dose route	Onset of sleep(min)	Duration of sleep (min)
control	1% tween 80 in water	10mg/kg, p.o	7.30±1.135	13.00±1.135*
Standard	Diazepam	1mg/kg, p.o	2.35±0.135*	147.40±6.135*
Test	EEEG	250mg/kg, p.o	17.80±1.235*	24.50±3.135*

All values are expressed as mean±SEM (N=5); ONE Way Analysis of Variance (ANOVA) followed by Turkey's test. *P<0.05,significant compared to control

Antibacterial Assay

Antibacterial activity of the Ethanolic extract were tested against seven pathogenic bacteria and were

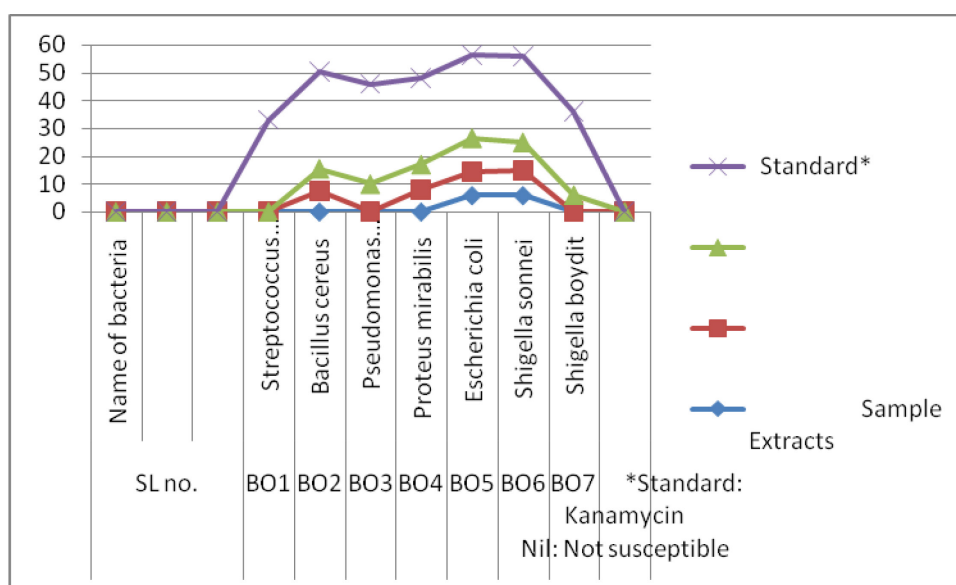
compared with the standard antibiotic Kanamycin by measuring the zone of inhibition diameter and expressed in millimeter (mm) showed in table.

Table -4 Antibacterial activity of Ethanolic extract of Elaeocarpus Ganitrus (EEEG)

SL no.	Name of bacteria	Sample Extracts			Standard*
		(Zone of inhibition in mm)			
		220 µg/Disc	330 µg/Disc	550 µg/Disc	
BO1	<i>Streptococcus agalactiae</i>	Nil	Nil	Nil	33
BO2	<i>Bacillus cereus</i>	Nil	7.5	8	35
BO3	<i>Pseudomonas aeruginosa</i>	Nil	Nil	10	36
BO4	<i>Proteus mirabilis</i>	Nil	8	9	31
BO5	<i>Escherichia coli</i>	6	8.5	12	30
BO6	<i>Shigella sonnei</i>	6	9	10	31
BO7	<i>Shigella boydit</i>	Nil	Nil	6	30

*Standard: Kanamycin Nil: Not susceptible

Fig: Line diagram of Table-4



Discussion

The present study demonstrated that the administration of 250mg per kg body weight dose of ethanol extract Seeds of Elaeocarpus Ganitrus (Rudrakasha) shows antidepressant properties. The dose independently reduced sleep by thiopental suggesting that the extract of Elaeocarpus Ganitrus did not induced a sleep inducing property. It is a well known fact that the drug which increase the GABA and inhibit neuromediator produced the sedative effect. Substances which possess antidepressant activity either prolong the time for onset of sleep or decrease the duration of sleep or

both. In addition to, the study on locomotor activity which is measured by hole cross and open field tests, showed that both doses of Ethanolic extract Elaeocarpus Ganitrus (Rudrakasha) show significant antidepressant activity. Antibacterial activity of the Ethanolic extract were tested against seven pathogenic bacteria and were compared with the standard antibiotic Kanamycin show that it show no effect on *Streptococcus agalactiae* but for other six pathogenic bacteria it show mild to moderate bactericidal action.

Conclusion:

In conclusion, it is revealed that the alcoholic extracts of *E. Ganitrus* obtained from the dried ripe fruits possess mild to moderate antidepressant activity. Antidepressant activity of Ethanol extract of *Elaeocarpus Ganitrus* was carried out using hole cross test, open field test and thiopental induced sleeping time test prove that *E. Ganitrus* Ethanol extract shows significant antidepressant activity in regular dose in comparison to diazepam but in Antibacterial activity

Study of *Rudraksha* show not very significant antibacterial activity in comparison to Kanamycin. *Streptococcus agalactiae*, *Shigella boydii* show resistant to alcoholic extracts of *E. Ganitrus* and other pathogenic bacteria show mild bactericidal action.

References:

1. David W. Lee (1991). Ultrastructural basis and function of iridescent blue color of fruits in *Elaeocarpus*, *Nature*, Vol. 349, No.6306, p. 260–262.
2. Joshi S C, Jain P K. (2014). A review on ethnomedicinal and traditional uses of *Elaeocarpus ganitrus* Roxb. (*Rudraksha*), *International Journal of Pharma and Bio sciences*. 5(1).P.495-511
3. Joyce Diamanti (2001). More about *Rudraksha*. The Bead Society of Greater Washington Newsletter. **18(2)**.P.6–8
4. Shah G, Singh PS, Mann AS, Shri R.(2011) Scientific basis for the chemical constituent and therapeutic use of *elaecarpus* species: a review. *Int J Inst Pharm & Life Sci*. 1. P.267-278.
5. Rates S M K.(2001). Plants as source of drugs, *Toxicon*, 39.P. 603-613.
6. Tripathy S, Mida A, Swain S.R. (2016). Phytochemical Screening And Thin Layer Chromatographic Studies Of *Elaeocarpus Ganitrus* Seed The Magical Electromagnetic Bead (*Rudraksha*). *International Journal of Pharmacy and Biological Sciences*.6 (3).P16-24
7. Tripathy S, Mida A, Swain S.R. (2016). Immunomodulatory Effect of Alcoholic Extract of Five Faced *Elaeocarpus Ganitrus* Beads *Imperial Journal of Interdisciplinary Research (IJIR)* .2(9).p.822-839
8. A.S, Hossain F, Rizwan F, Bhuyan S. H, Matin M and Jamaluddin A.T.M.(2013). Study of pharmacological activities of methanol

extract of *Jatropha gossypifolia* fruits *J Basic Clin Pharm*.4(1).P. 20–24.

9. Takagi K, Watanabe M, Saito H. (1971). Studies on the spontaneous movement of animals by the hole cross test: Effect of 2-dimethylaminoethan Its acylesters on the central nervous system. *Jpn J Pharmacol*.21.P.797
10. B. D. Gupta, P. C. Dandiya, and M. L. Gupta. (1971) “A psycho-pharmacological analysis of behaviour in rats,”*The Japanese Journal of Pharmacology*. 21(3). p. 293–298
11. [https://en.wikipedia.org/wiki/Open_field_\(animal_test\)](https://en.wikipedia.org/wiki/Open_field_(animal_test))
12. Blanchard, D. C., Griebel, G., Blanchard, R. J. (2001). Mouse defensive behaviors: Pharmacological and behavioral assays for anxiety and panic. *Neuroscience and Biobehavioral Reviews*. 25. P. 205-218.
13. Ramos, A., Berton, O., Mormede, P., Chaouloff, F. (1997). A multiple-test study of anxiety-related behaviours in six inbred rat strains. *Behavioural Brain Research*. 85.P. 57-69
14. Ozturk Y, Aydini S, Beis R, Baser KHC, Berberoglu H.(1996). Effect of *Hypericum pericum* L. and *Hypericum calycinum* L. extracts on the central nervous system in mice. *Phytomed*. 3(2).P.139–46.
15. Kolawole OT, Makinde JM, Olajide OA. (2007). Central nervous depressant activity of *Russelia equisetiformis*.*Nigerian Journal of Physiological Sciences*.22.P. 59-63.
16. Shahidi BH. (2004). Evaluation of antimicrobial properties of Iranian medicinal plants against *Micrococcus luteus*, *Serratia marcescens*, *Klebsiella pneumonia* and *Bordetella bronchiseptica*. *Asian J Plant Sci*. 3.P.82–6
17. Rios JL Recio MC, Villar A. (1988). Screening methods for natural products with antimicrobial activity: A review of the literature. *J Ethnopharmacol*.23.P.127–49
18. Elgayyar M, Draughon FA, Golden DA, Mount JR. (2001). Antimicrobial activity of essential oils from plants against selected pathogenic and saprophytic microorganisms. *J Food Prot*. 64.P.1019–24

19. Tamokou Jde, Kuate JR, Tene M, Kenla Nwemeguela, Tane P. (2011). The Antimicrobial Activities of Extract and Compounds Isolated from *Brillantaisia lamium*. *Iran J Med Sci.* 36. P.24–31.