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Deepika Yadav
B. S. Anangpuria Institute of
Pharmacy, Faridabad, Haryana,
India

Shiv K Yadav
B. S. Anangpuria Institute of
Pharmacy, Faridabad, Haryana,
India

Gaurav Jain
School of Pharmaceutical
Education & Research, Jamia
Hamdard, Delhi, India

Avijit Mazumder
Institute of Pharmacy, Noida
Institute of Engg. & Technology,
Greater Noida, Uttar Pradesh,
India

Roop K Khar
B. S. Anangpuria Institute of
Pharmacy, Faridabad, Haryana,
India

Corresponding Author:
Deepika Yadav
B. S. Anangpuria Institute of
Pharmacy, Faridabad, Haryana,
India

Protective effect of eugenol against electrical induced seizure model of epilepsy

Deepika Yadav, Shiv K Yadav, Gaurav Jain, Avijit Mazumder and Roop K Khar

Abstract

Clove is commonly used in Ayurveda, which is traditional system of Indian medicine. Clove is the prominent source of eugenol. Eugenol is reported for various pharmacological activities like anaesthetic activity, antioxidant potential, antimicrobial activity, anti-inflammatory activity, anti-cancer effects, neuroprotective action, hypolipidemic efficiency and anti-diabetic action. Therefore, in current study we investigated the effect of eugenol against the increased current electroshock model of epilepsy. Eugenol at dose levels of 0.20 ml/kg and 0.40 ml/kg, i.p. increased the threshold current significantly. The results demonstrate that Eugenol can be used for the treatment of generalized type seizures.

Keywords: Clove, anticonvulsant, eugenol

Introduction

Eugenol is a naturally occurring volatile phenolic component that can be isolated from a wide range of medicinal plant like clove, nutmeg, cinnamon and many others ^[1]. It is pale yellow oil phenyl propanoids having spicy aroma with 164.2 molecular weight ^[2]. Eugenol has already been reported for various pharmacological effects like antioxidant ^[3], anti-inflammatory ^[4], cardiovascular activities ^[5], neuroprotective action ^[6], antimicrobial ^[7], anti-cancer ^[8] and many more. Hence the present study was designed to investigate the anticonvulsant effect of eugenol against the electrical model of epilepsy (ICES: Increased current electro shock model).

Material and Methods

Swiss male albino mice weighing 20–35 g were used. Animals were housed in groups of six animals per cage and maintained at 20-30°C and 50-55% humidity in a natural light and dark cycle, with free access to food and water. The study was performed with prior approval of the institutional animal ethics committee (IAEC) of CPCSEA (Committee for the purpose of control and supervision of experiments on animals). Eugenol was purchased from Sigma-Aldrich USA, Diazepam from Lupin Ltd. and pentylenetetrazole from Sigma Aldrich USA. Drugs were freshly prepared by dissolving in normal saline. All i.p. injections were given in volumes of not more than 10 ml per kg of the body weight for mice. Sesame oil was used to make up the administrable volume of Eugenol.

Ices Test

The ICES test, as proposed by Kitano *et al.* ^[9], was used to evaluate the anticonvulsant effect of the drugs. Starting with a current of 2 mA, electroshock was delivered to each mouse via ear electrodes as a single train of pulses (square wave, 20Hz for 0.2 second) with a linearly increasing intensity of 2 mA/2 s. The current at which tonic hindlimb extension (HLE) occurred was recorded as the seizure threshold current (STC). If tonic HLE was not observed with a current of 30 mA, electroshock was terminated and this cutoff current was used in the analysis. The electro Convulsometer instrument used for study was made by Icon Instruments, New Delhi.

The eugenol dose was selected based upon that reported by E. Avanthi *et al.* ^[10] and in-house laboratory experiments. PTZ and diazepam were dissolved in saline to get the desired concentrations. Safranal was made up to the administered volume by diluting with sesame oil. Sesame oil was given in a volume of 10 ml/kg. All the treatments were done 30 minutes before giving ICES. Each mouse received only one type of treatment and test and was not reused.

Data Analysis

The results were presented as the mean \pm SEM. Data was analysed using a one-way analysis of variance (ANOVA) followed by Dunnett's t-test at the 95% confidence level. The difference was taken to be statistically significant at $p < 0.05$.

Results

Eugenol (0.4 ml/kg) significantly ($p < 0.0001$) enhanced the

seizure threshold as ascertained by ANOVA and Dunnett's test [$F(5, 30) = 45.79$], $p < 0.0001$], with the higher dose providing greater enhancement. Eugenol at 0.1 ml/kg did not affect seizure threshold (Figure 1) when compared with the control group. Eugenol also protected the animals against mortality in a significant manner (Figure 2).

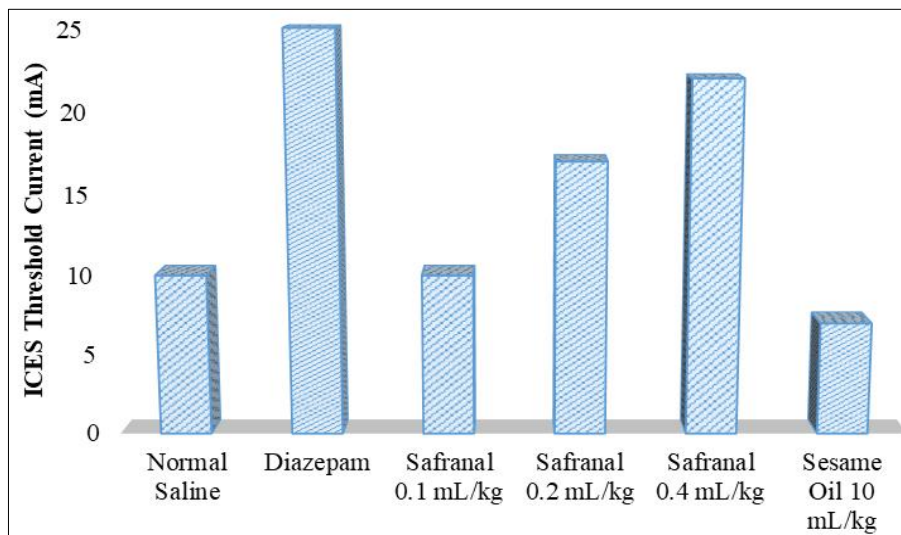


Fig 1: Effect of eugenol on the increasing current electroshock seizure threshold of mice.

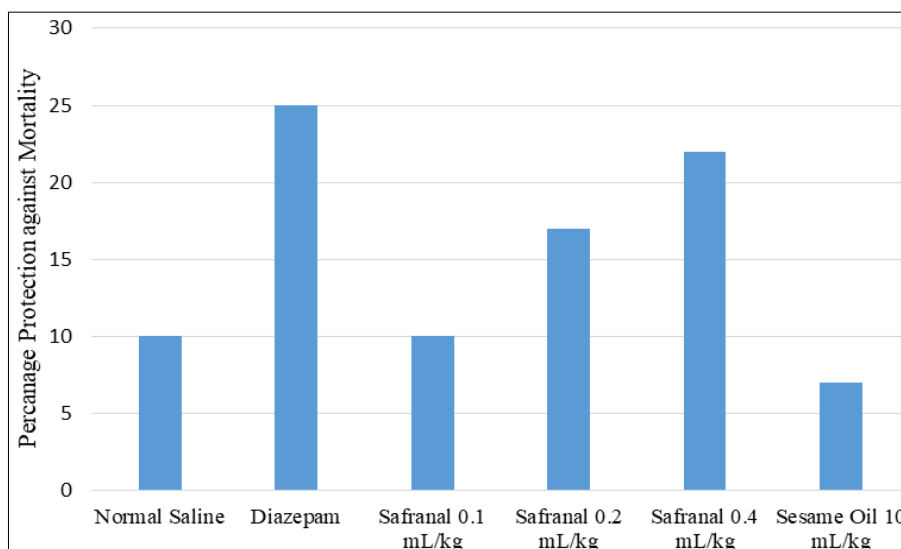


Fig 2: Protective effect of eugenol on the mortality in mice.

Conclusion

While the precise mechanism is yet to be elucidated, our preliminary observations clearly indicate a protective role for eugenol in generalized tonic-clonic/grand mal types of epilepsy as evidenced by the efficacy of eugenol in ICES induced seizure models.

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References

1. Anees AK, Ubaid UR, Moazzam RK, Amna S, Tariq M,

Muneeb K *et al.* Essential Oil Eugenol: Sources, Extraction Techniques and Nutraceutical Perspectives. *RSC Adv.* 2017; 7:32669.

2. Solmaz MN, Hilal O, Nursen B. Pharmacological and Toxicological Properties of Eugenol. *Turk J Pharm Sci.* 2017; 14(2):201-206.

3. Gulcin I. Antioxidant Activity of Eugenol: A Structure-Activity Relationship Study. *J Med Food.* 2011; 14(9):975-85.

4. Ahmad N, Ahmad FJ, Bedi S, Sharma S, Umar S, Ansari MA *et al.* A Novel Nano Formulation Development of Eugenol and Their Treatment in Inflammation and Periodontitis. *Saudi Pharm J.* 2019; 27(6):778-790.

5. Pramod K, Ansari SH, Ali J. Eugenol: A Natural Compound with Versatile Pharmacological Actions. *Nat*

- Prod Commun. 2010; 5(12):1999-2006.
6. Joushi S, Salmani ME. Effect of Eugenol on Lithium-Pilocarpine Model of Epilepsy: Behavioral, Histological and Molecular Changes. *Iran J Basic Med Sci.* 2017; 20(7):745-752.
 7. Walsh DJ, Livinghouse T, Goeres DM, Mettler M, Stewart PS. Antimicrobial Activity of Naturally Occurring Phenols and Derivatives Against Biofilm and Planktonic Bacteria. *Front Chem.* 2019; 7:653.
 8. Abdullah ML, Hafez MM, Al-Hoshani A, Al-Shabanah O. Anti-Metastatic and Anti-Proliferative Activity of Eugenol Against Triple Negative and Herb Positive Breast Cancer Cells. *BMC Complement Altern Med.* 2018; 18(1):321.
 9. Kitano Y, Usui C, Takasuna K, Hirohashi, Nomura M. Increasing Current Electroshock Seizure Test: A New Method for Assessment of Anti- and Pro-Convulsant Activities of Drugs in Mice. *J Pharmacol Toxicol Methods.* 1996; 35:25-29.
 10. Avanthi E, Pradeep Kumar L, Somashekar HS. The Study of Antiepileptic Activity of Clove Oil in Chemical Induced Convulsions in Mice. *IJBCP.* 2015; 4(5):956-959.