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PROTECTIVE ACTIVITY OF *LEUCAS MARTINICENSIS* AGAINST NAPHTHALENE INDUCED CATARACT IN RATS

Veda Vijaya T[1], Ranbir Verma[2], Sasi Kumar S[3], Asokan BR[4] and Jaikumar S[*5]

[1]Associate Professor, Department of Pharmacology, Madha Medical College and Research Institute, Kovur, Chennai, India.
[2]Department of Pharmacology, Dreamz College of Pharmacy, Mandi, Himachal Pradesh, India.
[3]Department of Physiology, Sri Ramachandra Medical College & Research Institute, Porur, Chennai, India.
[4]Department of Pharmacology, Aarupadai Veedu Medical College, Puducherry, India.
[5]Department of Pharmacology, Sri Lakshmi Narayanan Institute of Medical Sciences, Puducherry, India.

ABSTRACT

Plants of genus *Leucas* (Lamiaceae) are widely distributed throughout Asia, Africa, and India. The plant is used in traditional medicine to cure many diseases such as cough, cold, diarrhea, and inflammatory skin disorder. Anticataract activity of ethanolic extract of aerial parts of *Leucas martinicensis* was studied in rats. Naphthalene was used to induce cataract in rats. The animals were divided in to four groups of six animals each. Group I served as vehicle control received liquid paraffin 5ml/kg/day, group II served as cataract control received naphthalene 0.5 gm/kg/day p.o. for first three days and 1 g/kg/day p.o. thereafter, group III and group IV received *Leucas martinicensis* plant extract 200 mg/kg/day p.o and vitamin E 50 mg/kg/day respectively along with the naphthalene. All the above groups will be treated for 42 days. On the 42nd day lenses were removed from the eyes of all the animals to assess the intensity of cataract by estimating glutathione, lens soluble protein, and the lens water content. The results showed that, in the groups of *Leucas martinicensis* and vitamin E treated animals there was significant increase in the lens glutothione, soluble protein and water content as compared to galactose control. From the above results it was concluded that *Leucas martinicensis* plant extract possessed protective action against Naphthalene induced cataract in rats.

Keywords: *Leucas martinicensis,* Anticataract activity, Naphthalene and Vitamin E.

INTRODUCTION

Plants are indispensible sources of medicine since time immemorial. Studies on natural products are aimed to determine medicinal values of plants by exploration of existing scientific knowledge, traditional uses, and discovery of potential chemotherapeutic agents. Phytochemicals are used as templates for lead optimization programs, which are intended to make safe and effective drugs [1]. The genus *Leucas* comprises about 80 species. The highest species diversity has been found in Africa and Asia. In India, 43 species are available [2].

Corresponding Author

S. Jaikumar
Email id: sengt@rediffmail.com

Plants of genus *Leucas* are generally shrubs, subshrubs, annual herbs, or perennial herbs with woody root and/or stem base. Leaves are opposite, entire, or with spiky lobes, oval shaped with tapered end, petiolated, or sometimes without intervening stalk. The axillary or terminal inflorescence is usually with indeterminate augmentation. Bracteoles are roughly erect. The calyx shape varies within the genus (often tuberlar shape); sometimes calyx enlarges into fruits. Calyx comprises of five connate sepals (one upper, two lateral and two lower) and 5–20 secondary lobes. Whitish hairs are generally present on the outer surface of the upper lip of the corolla, although yellowish cream color or red hair can also be present in some species [3]. The investigated parts of the *Leucas* species include roots, seeds, stem, leaves, and

whole plants. The present review not only covers phytochemical progress made on the plants of genus *Leucas* over the past few decades but also incorporates their uses in different formulations and in the treatment of various diseases by the traditional healers across the globe. Among the *leucas* species, *Leucas martinicensis* has various biological uses.

Cataract is visual impairment as a result of a disturbance of lens transparency. It is one of the leading cause of blindness worldwide, it accounts for approximately 42% of all blindness. More than 17 million people are blind because of cataract, and 28000 new cases are reported daily worldwide. Approximately 25% of the populations over 65 and about 50% over 80 have serious loss of vision because of cataract [4]. Even though modern treatment is well established for various opthalmic disorders, traditional system of treatment still sustaining due to its safety. *Leucas* (Lamiaceae) have been widely employed by the traditional healers to cure many diseased conditions, which insinuated that this genus has immense potential for the discovery of new drugs or lead molecules. Hot water extract is used orally for gastroenteritis, cholera, malaria, syphilis, leprosy, diarrhea, and dysentery. The leaves are also used orally for pain during pregnancy. The infusion is used ophthalmically for proptosis, for conjunctivitis, and for corneal disease [5]. The present study was conducted to evaluate the anticataract activity of whole plant extract of *Leucas martinicensis against* naphthalene induced catract in rats.

MATERIAL AND METHODS

Plant Material

The plant *Leucas martinicensis* were collected from outskirts of Kanyakumeri District, in the month of October. The plant were identified as *Leucas martinicensis* and authenticated by the botanist, Botanical Survey of India, Agricultural University, Coimbatore. The (voucher no:16/2775) specimen had been deposited in the herbarium for future reference.

Preparation of Extract

The collected plant materials were washed in running water to remove the adhering foreign matter and shade dried. The dried plant materials were coarsely powdered by mechanical blender. The coarse powder was soaked in 95% ethanol solution for 24 h followed by cold maceration for further 48 h with occasional shaking. The mixture was filtered using muslin cloth followed by removal of excess of solvent by means of rotatory evaporator. The dried extract was used for the study.

Animals

Male Wistar Albino rats weighing between 180–200 g were used for the study. The animals were obtained from animal house of Sri Lakshminarayanan Institute of Medical Sciences, Pondicherry, India. On arrival the animals were placed at random and allocated to treatment groups in polypropylene cages with paddy husk as bedding. Animals were housed at a temperature of $24 \pm 2^{o}C$ and relative humidity of 30–70 %. A 12:12 light: dark cycle was followed. All animals were allowed free access to water and fed with standard commercial pelleted rat chaw (Hindustan Lever Ltd, Mumbai). All the experimental procedures and protocols used in this study were reviewed by the Institutional Animal Ethics Committee (932/a/06/CPCSEA) and were in accordance with the guidelines of the IAEC.

Naphthalene Induced Cataract

The Wistar rats weighing between 180-200 g were randomly divided into four groups of five each. Group I served as control received liquid paraffin 5ml/kg/day, group II served as cataract control received naphthalene 0.5 gm/kg/day p.o. for first three days and 1 g/kg/day p.o. thereafter, group III and group IV received *Leucas martinicensis* plant extract 200 mg/kg/day p.o and vitamin E 50 mg/kg/day respectively along with the naphthalene [6]. All the above groups were treated for 42 days. On 42nd day cataract was examined under slit lamp. The lenses are removed from the eyes of all the animals for estimation of lens glutathione [7] lens soluble protein [7] and the lens water content [8].

Statistical Analysis

Results were expressed as mean ± SEM. The data were analyzed by using one way analysis of variance (ANOVA) followed by Dunnet's t test. P values < 0.05 were considered as significant.

RESULTS

Table 1. Effect of *Leucas martinicensis* plants on lens glutothione, soluble protein and water content on Naphthalene induced cataract in rats

Groups	Drug Treatment	Glutathione (x 10^{-5} moles)	Soluble Protein (mg)	Water Content (%)
I	Vehicle Control	13.06±1.12***	9.78±0.44***	56.07±1.34***
II	Naphthalene Control	5.90±0.20	5.87±0.1	32.98±2.04
III	*Leucas martinicensis*	6.63±0.54***	8.01±0.18***	46.69±2.56***
IV	Vitamin E	9.05±0.66***	8.95±0.46***	51.22±1.78***

Values are in Mean ± SEM; (n = 6) *P < 0.05,**P < 0.01, *** P < 0.001 Vs Group II.

DISCUSSION

The Cataract protective action of ethanolic extract of *Leucas martinicensis* plant was studied in Naphthalene induced rats. Effect of *Leucas martinicensis* plant on lens glutothione, soluble protein and water content on napthalene induced cataract in rats was shown on table 1. In the animals treated with Naphthalene alone, there was decrease in the lens Glutathione, soluble protein and water content as compared to vehicle control. In the groups of *Leucas martinicensis* and vitamin E treated animals there was significant increase in the lens glutothione, soluble protein and water content as compared to galactose control.

Naphthalene-induced cataract has been extensively used to test potential anti-cataract drugs. Because the morphology as well as the toxic manifestations of naphthalene-induced cataract is reported to be similar to that of age-related cataract, naphthalene cataractogenesis in rats has been used as a valuable animal model to study the etiology of age related cataract in humans. Ingested naphthalene is metabolized in the liver to the stable compound naphthalene- 1, 2-dihydrodiol and it is further metabolized to NQ by an enzyme dihydrodiol dehydrogenase. Which has ability quickly react with glutathione or protein sulfhydryl groups and causes its alkylation. This lead to the formation of disulphide bridges causing precipitation of high molecular weight protein, hence opalescence in the lens. The formation of NQ is considered to be the underlying mechanism of cataract development in naphthalene fed animals [10]. Aldose reductase is the key enzyme for the metabolism of naphthalene-1, 2-dihydrodiol in the process of naphthalene cataract development. The anticataract activity possessed by the *Leucas martinicensis* may be due to inhibiting the above enzyme responsible for the formation of cataract.

CONCLUSION

From the above result it was concluded that *Leucas martinicensis* plant exhibited anti cataract activity against naphthalene induced cataract in rats. Further studied is entail towards the isolation of active principle responsible for the anticataract activity of *Leucas martinicensis* plant.

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