

Traditional Uses, Phytochemical And Pharmacological Activity Of *Elaeocarpus Serratus*: A Global Perspective

P. MAHESHWARI¹, FASEELA V A^{*1,2}, P. SHANMUGASUNDARAM³

¹Department of Pharmacy Practice, School of Pharmaceutical Sciences, Vels Institute of Sciences, Technology and Advanced Studies (VISTAS), Pallavaram, Chennai-600117, India

²Westfort College of pharmacy, Pottore, Thrissur-680581

*Address for correspondence Email : faseelathahir011@gmail.com

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Abstract

Tropical flowering tree belonging to the family Elaeocarpaceae. It is distributed in Srilanka, South India, Assam, Bangladesh and other parts of North Indian Subcontinent. The fruit of the tree is commonly eaten and the people also use for ornamental and folk medicinal purposes. *Elaeocarpus serratus* is also known as Ceylon olive. Studies indicate *Elaeocarpus serratus* possess anti diarrhoeal, analgesic, antidiabetic and anti-arthritic activity. Various other effects like antioxidant, antimelanogenesis and anti-microbial studies have also been studied. These results are very significant and this literature review was intended to study about the plant more extensively to confirm these results and reveal other potential therapeutic effects.

Keywords : *Elaeocarpus serratus*, pharmacological activity, phytochemical

INTRODUCTION

Plants have been used for medicinal purposes long before prehistoric period. Ancient Unani manuscripts Egyptian papyrus and Chinese writings described the use of herbs. Evidence exist that Unani Hakims, Indian Vaid and European and Mediterranean cultures were using herbs for over 4000 years as medicine. Indigenous cultures such as Rome, Egypt, Iran, Africa and America used herbs in their healing rituals, while other developed traditional medical systems such as Unani, Ayurveda and Chinese Medicine in which herbal therapies were used systematically.

Traditional systems of medicine continue to be widely practised on many accounts. Population rise, inadequate supply of drugs, prohibitive cost of treatments, side effects of several synthetic drugs and development of resistance to currently used drugs for infectious diseases have led to increased emphasis on the use of plant materials as a source of medicines for a wide variety of human ailments.

The genus *Elaeocarpus* comprises of tropical and subtropical evergreen trees and shrubs, belonging to the family Elaeocarpaceae, includes approximately 350 species distributed from Madagascar in the west to New Zealand in the east; covering the regions of Southeast Asia, Southern China, Japan, Malaysia, Australia, New Guinea, Fiji and Hawaii. About 30–45 species are indigenous to the Indian Subcontinent, of which *Elaeocarpus serratus* L. is one of the medically and commercially valuable species.^[1]

Elaeocarpus serratus is a fruit tree, which grows 8–15 m in height, and 5–10 m in canopy spread, blooms during September-October, fruiting occur during January. Fruits are ovoid or globose berries of 4–5 cm long and pulpy

pericarp encloses a stony seed. Ripened fruits of *E. serratus* are sour-sweet taste with characteristic aroma make them one of the potential table fruits in the tropics.^[2]

Phenolic compounds found in plant materials are known to have many biological benefits for human health. The fruit of *E. serratus* contains carbohydrates, protein, polyphenolic compounds (flavonoids, condensed tannins, etc.), carotenoids, and vitamins. The leaves of *E. serratus* are the by-product after harvest of fruit, and have significant quantities of polyphenols and flavonoids, including myricitrin with antioxidant activity and pharmacological properties.^[3]

PHYTOCHEMISTRY AND PHARMACOLOGY

The leaves of *E. serratus* are good source of bioactive compounds such as fatty acid esters, alcohols, hydrocarbons, aldehydes, alkenes, fatty acids and amides that justify the use of this plant for its various ailments by traditional practitioners

Ethanol extract of leaf of *E. serratus* were analyzed for the presence of different compounds by GC-MS. Thirty compounds were detected in the ethanolic extract of *E. serratus* leaf. Among the identified phytochemicals, the fatty acid esters namely, docosanoic acid, 1,2,3-propanetriyl ester, hexadecanoic acid methyl ester have the property of antioxidant, hypocholesterolemic, nematocide, pesticide, flavouring agent, lubricant and anti-androgenic activities.^[4]

The determination of bioactive compounds showed that *E. serratus* fruit presented a good source of flavonoids, condensed tannins, carotenoids and Vitamin C. In the chromatographic analyses, the presence of β -amirin was observed as the major compound by gas chromatography. Among the main phenolic compounds, the presence of kaempferol and quercetin in the liquid chromatography method was evidenced.^[5]

Antimicrobial activity

Ethanol extract from *E. serratus* fruit showed antimicrobial activity against *Bacillus cereus*, *Escherichia coli*, *Salmonella choleraesuis*, *Staphylococcus aureus* and *Xanthomonas campestris*. Flavonoids, hydrolysable tannins and phenolic compounds are responsible for the activity.^[5]

The in vitro antimicrobial activity of acetone, methanol and water extracts of leaf, stem bark and fruit of *Elaeocarpus serratus* L. (*Elaeocarpaceae*) was examined against four bacterial species (*Shigella sonnei*, *Salmonella typhi*, *Staphylococcus aureus* and *Klebsiella pneumoniae*) and a fungal species (*Candida albicans*) using the agar well diffusion method. Phytochemical screening was carried out for phenols, flavonoids and tannins. Results showed that the plant extracts exhibited a dose-dependent inhibition of microorganisms. The acetone and methanol extracts of leaf and stem bark of *E. serratus* displayed maximum antibacterial activity against all the bacterial species studied. The plant extracts also displayed high antifungal activity against *Candida albicans* especially, the acetone extract was found to be more active antifungal.^[6]

Antioxidant activity.

The antioxidant activity of the crude methanolic extract of *E. serratus* L. leaves has shown dose dependent antioxidant property. In vitro DPPH antioxidant assay showed IC₅₀ of *E. serratus* as 75.47 μ g/ml while the IC₅₀ of standard ascorbic acid was found to be 25.53 μ g/ml.^[7]

The valorization of *Elaeocarpus serratus* L. leaves was explored using ultrasound to assist in the extraction of total phenolic compounds, total flavonoids, and myricitrin. Using 40 kHz of ultrasound and 95% ethanol, the high contents of bioactive compounds and myricitrin from the leaves was achieved, and the high antioxidant activity of the extract was observed for UAE at 40 kHz.^[8]

The pet-ether soluble fraction (PEF), Carbon tetrachloride soluble fraction (CTSF) and Chloroform soluble fraction (CFSF) of the methanolic extract of stem bark of *Elaeocarpus serratus* were investigated for cytotoxic

activity using brine shrimp lethality bioassay. The methanolic extract was also evaluated for possible antioxidant activity using nitric oxide scavenging activity and reducing power assays. ^[9]

Antimelanogenesis

The leaf extract of *Elaeocarpus serratus* leaves showed antimelanogenesis and antityrosinase activity. Results from zebra fish in vivo assay revealed that an ethyl acetate soluble fraction and three phytochemicals possessed significant melanogenesis inhibition effects. The antimelanogenesis effect of mearnsetin was superior to that of the positive control, arbutin, in zebrafish. ^[10]

Antidiarrheal activity

The methanolic bark extract of *E. serratus* showed an effective anti diarrhoeal activity in mice model. In antidiarrheal activity assay, the *E. serratus* substantially reduced the number of diarrheal feces 64.26% and 78.57% which was also comparable with the positive control loperamide ^[11]

Analgesic activity

The bark extract of *E. serratus* exhibited potential peripheral and central analgesic activity in mice model. In the peripheral analgesic assay, the methanolic bark crude extract of *E. serratus* significantly inhibits the number of writhing 69.77% (200 mg/kg) and 73.26% (400 mg/kg) respectively ($p < 0.05$) which was strongly comparable with standard NSAID drug diclofenac sodium 75.58% ($p < 0.05$). Similarly, it shown a significant tail flicking response for 30 minutes, 60 minutes and 90 minutes of central analgesic activity assay ^[11]

Anti arthritic activity

the anti-arthritic activity of ethanolic extracts of leaf and seed of *Elaeocarpus serratus* L. was evaluated in vitro using two models namely on the inhibition of protein denaturation and anti-proteinase activities. Indomethacin was used as a standard drug. Results revealed that the ethanolic leaf and seed extracts of *E. serratus* at two different concentrations (200 and 400 $\mu\text{g/ml}$) possessed notable activity as compared to the standard drug indomethacin, justifying its usefulness in the treatment of inflammation associated diseases like arthritis. ^[12]

The anti-arthritic effect of oral administration of ethanolic extracts of leaf and seed of *Elaeocarpus serratus* was also evaluated using Freund's adjuvant arthritis model in Wistar rats. The in vivo studies support the traditional use of this plant and it can be used as anti-arthritic drug. ^[13]

Anti diabetic activity

The fruit of ethanolic extract of *Elaeocarpus serratus* showed significant anti diabetic activity in streptozotocin-induced (STZ) diabetic rats. The dose-dependent effects of 30 days oral treatment with ethanol extracts of fruit (200 and 400 mg/kg) of *E. serratus* on body weight, blood glucose level, total protein, albumin, liver marker enzymes and carbohydrate metabolizing enzymes were evaluated in STZ-induced diabetic rats. Oral administration ethanolic extract of fruit of *E. serratus* showed significant restoration of the body weight and decrease in the blood glucose level, liver marker enzymes (ALT, AST ALP) and carbohydrate metabolizing enzymes were observed in diabetic rats. ^[14]

CONCLUSION

The literature review states that *Elaeocarpus serratus* possess significant effect on arthritis, diabetic and analgesic activities. The antioxidant properties of the plant also give good insight for more research works on this plant. The pharmacological studies on the different extracts of plant validates the traditional use of plant. The safety profile of the plant is deficient. The bioactive compounds present in the different extract validates the importance of the plant. Further research on this area may give a possible mechanism of action and more hopeful drugs can be invented.

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