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Review on Phytoconstituents and Pharmacology of *Leucas plukenetii*

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Abstract:- ***Leucas plukenetii*, a member of the Lamiaceae family, has a vast distribution over Asia, Africa, and India. The plant is employed in traditional medicine for the treatment of several ailments including cough, cold, diarrhoea, and inflammatory dermatological conditions. The extracts of these plants and their phytoconstituents have been found to possess anti-inflammatory, antidiabetic, antibacterial, antioxidant, and cytotoxic properties. This review provides a comprehensive examination of the ethnobotanical, phytochemical, and pharmacological research conducted on the *Leucas plukenetii*.**

Keywords:- *Bioactive Constituents, Ethno Medical Information, Leucas.*

I. INTRODUCTION

The utilisation of plants for medical purposes has a long-standing history. Evidence suggests that the therapeutic utilisation of plants dates back to approximately 4000–5000 B.C., with the Chinese being the first to employ natural herbal concoctions as medicinal remedies. The earliest mentions of using plants as medicine in India may be found in the Rigveda, believed to have been composed between 1600-3500 B.C [1]. Ancient physicians in India extensively investigated the qualities and therapeutic applications of medicinal plants, documenting their findings in the ancient medical discipline of 'Ayurveda'. In the 5th century AD, the Hindu Physician Susruta documented a total of seven hundred and sixty medicinal plants in Ayurveda [2]. The issue of antibiotic resistance is steadily increasing. The extensive and unselective utilisation of antibacterial drugs led to the emergence of drug resistance in numerous highly harmful bacterial species. Several of the antibacterial agents now in use are linked to negative effects, including toxicity, hypersensitivity, immunological suppression, and the presence of residues in tissues that pose a risk to public health..

Therefore, additional novel alternative treatments for bacterial disorders are typically necessary. Given the current global shift towards non-toxic and eco-friendly products, it is crucial to prioritise the development of new medications derived from traditional medicinal plants. These drugs can play a significant role in controlling many diseases in both humans and animal[3].

Multidrug resistance consistently leads to therapeutic ineffectiveness. The number of multi-drug resistant microbial strains and the prevalence of bacteria with reduced susceptibility to antibiotics are continuously increasing. The development has been attributed to the erratic use of broad-spectrum antibiotics, an immunosuppressive drug, intravenous catheters, organ transplantation, and ongoing outbreaks of HIV infection. In addition to this problem, antibiotics are sometimes associated with adverse effects on the host, such as severe sensitivity, immune suppression, and allergic reactions. Researchers were compelled to seek out novel antibacterial compounds due to this situation. Given the alarming prevalence of antibiotic resistance in medically significant bacteria, there is a constant need for new and effective therapeutic agents. Therefore, it is necessary to develop targeted antibacterial drugs derived from medicinal plants for the treatment of infectious diseases [4].

Leucas Plukenetii, a member of the laminaceae family, grows as a weed in Badlands and along roadsides throughout India. The literature survey indicates that tribes in various regions of Asia and Africa have historically employed it. A wide variety of species, together with their various parts and methods of application or administration, are commonly used to treat different local infectious conditions [4].

II. PLANT DESCRIPTION

- Habit: An annual herb with square stem.
- Leaves: Linear-oblong or oblong lanceolate.
- Flowers: Sessile, ciliate with long hairs.
- Fruit: Oblong, inner face sharply angular
- Flowering and Fruiting Time: July-October
- Plant Form: Herb [5].

➢ **VERNICULAR NAME**- Doron Bon [6].

➢ **SYNONYM-** Leucas aspera [7].

Fig-1. *Leucas plukenetii*

➢ *Ethnomedicinal Uses of Leucas plukenetii-*

- The Kaviraj's utilise the leaves and blossoms for the treatment of dental infections and mucous [8].
- It is topically administered on areas of inflammation to alleviate pain and reduce inflammation [9].

- Apply a lime juice paste externally to relieve headaches.
- The flowers were crushed and the extract was administered slowly into the nostril on the opposite side to alleviate migraines.
- In the event of a snake bite, forcefully insert chewed leaves containing pepper and garlic into the nose.
- The entire plant is excavated in the early morning and transformed into a paste by mixing it with water.
- To provide medical care for injuries and parasitic infections [10].

III. PHYTO-CHEMICAL EVALUATION

In their study, Sadhu et al. (2003) successfully isolated eight lignans from the methanol extract of the entire plant. These lignans were identified as nectandrin B, (-)-chicanine, meso-dihydroguaiaretic acid, macelignan, myristargenol B, erythro-2-(4-allyl-2,6-dimethoxyphenoxy)-1-(4-hydroxy-3-methoxy phenyl) propan-1-ol, Machilin C, and (7R,8R)-and(7S,8S)-licarin.

Manivannana and Sukumar (2007) identified the presence of the flavonoid compound 'baicalein' in the ethereal fraction of the hydro methanolic extract of the flower.

Gerige et al. (2007) and Mangathayaru et al. (2006) discovered that it contains a significant quantity of a-farnesene, α-thujene, and menthol.

Sadhu et al. (2006) have reported the discovery of a novel class of diterpenes, namely leucasperones A and B, as well as leucasperols A and B.

Chen et al. (1979) discovered the presence of linoleic acid, which was dependent on the fluctuation in crops.

Rajyalakshmi et al. (2001) discovered that Leucas aspera and Leucas cephalotes have substantial quantities of total carotenoid and β-carotene [11].

IV. PHARMACOLOGICAL ACTIVITY

- *Antimicrobial Activity*

Mangathayaru et al. (2005) found that both the alkaloidal fraction and the whole methanol extract of the flowers exhibited substantial antibacterial activity [12].

The study conducted by Satyal et al. (2013) found that the plant's essential oil did not exhibit any effectiveness against E. coli, P. aeruginosa, and C. albicans. The oil had significant efficacy against S. aureus, B. cereus, and A. niger, primarily due to the presence of sesquiterpenes in the oil. Both (E)-caryophyllene and α-humulene have demonstrated antibacterial action against B. cereus and S. aureus, whereas α-humulene exhibited antifungal properties against A. niger[13].

Ilango et al. (2008) conducted an evaluation and discovered that the Ethyl acetate extract (EAE) of the entire plant demonstrated moderate to significant antibacterial activity against all tested microorganisms. This activity was dependent on the concentration of the extract, with concentrations of 50, 100, 200, 300, and 400 µg/disc showing effectiveness. The antibacterial activity of the extract was comparable to that of various antibiotics used against each microorganism individually. Additionally, this study demonstrates that EAE exhibited significant activity against Staphylococcus epidermidis and Klebsiella pneumoniae [14].

Chew et al. (2012) assessed the antimicrobial efficacy of raw extracts from the root, flower, and leaf, which exhibited significant antibacterial properties. The root extract exhibited the greatest average zone of inhibition, extending from 9.0 to 11.0 mm, when tested at a dose of 100mg/mL[15].

Antony et al. (2013) provides a description of the process of synthesising silver nanoparticles (AgNPs) using a plant through a green approach. The AgNPs were assessed for their antimicrobial activity against Aeromonas hydrophila. The experimental model organism, Catla catla, was separated into six groups, each consisting of 15 animals. The use of AgNPs in the fish model was supported by in vivo study of biochemical parameters and histological architecture, which gave proof of their antibacterial action [16].

- *Central Nervous System Activity*

In their study, Rahman et al. (2007) discovered that the ethanolic extract of the root exhibited noteworthy peripheral antinociceptive effect when administered at a dosage of 400 mg/kg [17].

- *Antioxidant Activity*

In their study, Rahman et al. (2007) discovered a notable level of activity in the ethanolic extract of the root, with an IC50 value of 7.5 µg/ml [17].

In their study, Chew et al. (2012) assessed the antioxidant activity of a methanol extract derived from the root. They found that the extract exhibited antioxidant activity comparable to that of vitamin E, suggesting that it could serve as a valuable natural source of antioxidants [15].

- *Hepatoprotective Activity*

Thenmozhi et al. (2013) reported that hydroalcoholic leaf extract has hepatoprotective properties by reducing lead acetate-induced aberrant elevations of liver enzymes [18].

Mangathayaru et al. (2005) demonstrated The methanolic extract of the entire plant demonstrated substantial hepatoprotective effects against liver damage induced by CCl4 [19].

In their study, Banu et al. (2012) discovered that the injection of d-galactosamin in rats resulted in hepatotoxicity. This was evident by the elevation of many markers including alanine aminotransferase, aspartate aminotransferase, alkaline phosphatase, total cholesterol, triglycerides, total bilirubin, and oxidative stress. Pre-treatment with LA extract shown a strong hepatoprotective effect in rats that were fed d-galactosamine. Lauric acid extract substantially increased the activity of antioxidant enzymes such as superoxide dismutase, catalase, and glutathione peroxidase, while reducing levels of lipid peroxidation in the liver. The aqueous extract of LA was determined to have a total phenolic content of 28.33 ± 0.19 mg/g of extract, expressed as gallic acid equivalents, and a total flavonoid content of 3.96 ± 0.57 mg/g of extract, expressed as rutin equivalents. Treatment with LA extract at doses of 200 and 400 mg/Kg reduced the hexobarbitone-induced sleeping time in mice by 56.67% and 71.30% respectively. This suggests that LA has a protective impact on hepatic MDMEs. Histological examinations demonstrated that the administration of LA at a dosage of 400 mg/kg reduced the extent of hepatocellular necrosis in rats that were drunk with d-galactosamine [20].

- *Anti-Inflammatory Activity*

According to Reddy et al. (1986), the entire plant extract exhibited anti-inflammatory properties and induced the release of granules from mast cells [17].

The authors Reddy et al. (1986) showed anti-inflammatory efficacy in both chronic and acute types of inflammation for the yellow chromatographic fraction of the extract. The activity was attributed to the suppression of histamine and serotonin, as noted in the study [21].

Saundane et al. (2000) made similar discoveries and reported that the preliminary screening of ethanol and distilled water extracts showed considerable anti-inflammatory action. However, only the ethanol (95%) extract induced long-term analgesia in the experimental animals [22].

In their study, Srinivas et al. (2000) found that the dried leaves of the plant exhibited notable anti-inflammatory effects against carrageenan-induced paw edoema and cotton pellet-induced granuloma when extracted using alcohol or water [23].

Goudgaon et al. (2003) concluded that the alkaloid fraction of the crude ethanolic extract is accountable for the antiinflammatory activity [24].

- *Cytotoxicity*

Krishnaraju et al. (2005) demonstrated that the hydroalcoholic extract of the entire plant showed cytotoxic effects, with a lethal concentration (LC50) of 1,900 µg/ml. Furthermore, the root extract revealed even higher cytotoxicity, with an LC50 of 52.8 µg/ml.

In a study conducted by Chew AL et al. (2012), a brine prawn lethality test was done, which clearly demonstrated that the methanol root extract did not exhibit noteworthy toxicity. The LC50 value for the 12-hour observation period was 2.890 mg/mL, while for the 24-hour observation period it was 1.417 mg/mL [15].

- *Larvicidal Activity*

Maheswaram et al. (2008) The findings of the present investigation revealed that L. aspera has good larvicidal activity of the plant activity against *Culex quinquefasciatus Say*. and *Aedes aegypti* [26].

- *Antihyperglycemic Activity*

In their study, Mannan et al. (2010) conducted an experiment to investigate the antihyperglycemic efficacy of a plant extract in mice. The methanol extract of leaves exhibited a strong and dose-dependent antihyperglycemic effect when given to mice with glucose challenge. The stem extract also shown substantial and dosage-dependent antihyperglycemic efficacy in glucose tolerance tests conducted on mice [27].

Nevertheless, the dosage required for the antihyperglycemic activity exhibited by the stem extract was lower compared to that of the leaf extract. When administering a dose of 400 mg extract per kg body weight, the serum glucose levels decreased by 28.39%, compared to a decrease of 34.01% observed with the same dose of leaf extract. In summary, the leaf extract had a statistically significant antihyperglycemic effect when administered to glucose-loaded rats at a dosage of 200 mg per kg body weight. The user's text is incomplete and does not provide enough information to rewrite it in a straightforward and precise manner [27].

V. CONCLUSION

Leucas plukenetii is a prevalent species in traditional medicine, known for its efficacy in treating various illnesses. It exhibits a diverse range of pharmacological activities including wound healing, cytotoxicity, antibacterial activity, anti-inflammatory effects, antioxidant properties, analgesic effects, hepatoprotective effects, and potential for reducing high blood sugar levels. In order to expand the pharmacological application of a medicine, it is necessary to identify the precise components responsible for its unique activity in commercial drug formulations. Additionally, due to the substantial demand for this species in the medical plant sector, it is necessary to engage in the production of *Leucas plukenetii*.

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