

Analgesic Activity of Ethanolic Extract of Ocimum Species in Frogs

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Abstract—The present investigation evaluated the analgesic potential of ethanolic extract of *Ocimum basilicum* using *Rana tigrina* as an experimental model. Herbal medicines are widely explored because of their comparatively lower adverse effects and traditional therapeutic importance. In this study, frogs were selected as a simple and economical experimental model to assess pain modulation through behavioural parameters such as eye blinking and buccal oscillations. Ethanolic extract of *Ocimum basilicum* was administered in different doses and compared with paracetamol as the standard analgesic drug. The extract demonstrated a significant reduction in eye blinking and buccal oscillations after induction of pain using sodium chloride solution, indicating analgesic activity. The findings support the traditional medicinal use of *Ocimum* species and suggest that flavonoids, phenolic compounds, and volatile oils present in the extract may contribute to pain inhibition. The study highlights the importance of medicinal plants as potential alternatives for pain management and encourages further pharmacological investigations.

I. INTRODUCTION

Medicinal plants have played an essential role in healthcare systems for centuries. Traditional systems such as Ayurveda, Siddha, and Chinese medicine have utilized herbal preparations for the treatment of inflammation, fever, pain, and infectious diseases. Medicinal plants contain several phytoconstituents including alkaloids, glycosides, tannins, flavonoids, terpenoids, and essential oils that produce therapeutic effects. Recent scientific interest in plant-based medicines has increased due to concerns regarding the adverse effects associated with synthetic drugs. Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue injury. Although pain acts as a protective mechanism, prolonged pain can negatively influence physical and

psychological well-being. Non-steroidal anti-inflammatory drugs (NSAIDs) and opioids are commonly used for pain relief, but prolonged administration may result in gastrointestinal irritation, nephrotoxicity, tolerance, and dependence. Therefore, medicinal plants are increasingly investigated as safer alternatives for analgesic therapy. *Ocimum basilicum*, commonly known as sweet basil, belongs to the family Lamiaceae. The plant is rich in volatile oils, flavonoids, eugenol, tannins, and phenolic compounds. Earlier reports suggest that *Ocimum* species possess antimicrobial, antioxidant, anti-inflammatory, and analgesic properties. The presence of phytoconstituents capable of inhibiting inflammatory mediators supports its use in traditional medicine for pain relief.

The present study was designed to evaluate the analgesic activity of ethanolic extract of *Ocimum basilicum* in *Rana tigrina* frogs. Eye blinking and buccal oscillations were selected as measurable behavioural indicators of pain response. The study also aimed to compare the efficacy of the plant extract with paracetamol, a standard analgesic drug.

II. MATERIALS AND METHODS

Rana tigrina frogs of either sex weighing between 100–150 g was used for the study. The animals were maintained under standard laboratory conditions. Experimental procedures were performed carefully to minimize stress to the animals. A glass flask fitted with a porous platform was used during the observation period. Pain was induced by subcutaneous administration of 4% sodium chloride solution into the abdominal region. Eye blinking frequency and buccal oscillations were observed for five minutes before and after administration of the test and standard drugs.

The animals were divided into three groups:

1. Control group – received distilled water.
2. Standard group – received paracetamol along with sodium chloride.
3. Test group – received ethanolic extract of *Ocimum basilicum*.

Different doses of paracetamol and plant extract (0.1 mL, 0.2 mL, 0.3 mL, 0.5 mL, and 0.7 mL) were administered subcutaneously. Behavioural responses were recorded and compared among the groups. Reduction in eye blinking and buccal oscillations was considered indicative of analgesic activity.



Fig: 1



Fig :2



Fig:4



Fig :3

III. RESULTS AND DISCUSSION

The experimental findings demonstrated that sodium chloride significantly increased eye blinking and buccal oscillations, confirming induction of pain. Administration of paracetamol produced a marked reduction in behavioural responses, validating the experimental model.

Different groups of animals were used for the determination of the effective concentration of NaCl.

Group	Type	No. of Animals	Treatment
Group -1	Control	6	2 ml distilled water (SC)
Group -2	Standard	6	NaCl & Paracetamol (SC)
Group -3	Test	6	NaCl & Plant extract (SC)

Group-1 Determination of an effective 4% of NaCl concentration solution of No. of Eye blinks and Buccal oscillations.

Group (n=6) control	Eye blinks after 4% NaCl (5 min)	Buccal oscillations	% Increase
Distilled water (2 ml)	1.66 ± 0.20	81.33 ± 73.9	70%
4% NaCl	2.83 ± 0.89	1750 ± 165.7	215%

Group-2 Determination of an effective 4% NaCl solution of the standard drug on eye blinking and buccal oscillation.

Group (n=6)	No. of eye blinks	No. of buccal oscillations	% inhibition
4% NaCl	3.166 ± 0.2	123.3 ± 90	74
Standard drug (Paracetamol)	0.830 ± 0.15	91.3 ± 87.0	74.25

Group-3 Determination of an effective 4% NaCl solution of the test drug on eye blinking and buccal oscillation

Group (n=6)	No. of eye blinks	No. of buccal oscillations	% inhibition
4% NaCl	2.66 ± 0.50	116.6 ± 107.3	81.2
Test (Plant extract)	0.5 ± 0.3	84.6 ± 78.1	72.98

Similarly, treatment with ethanolic extract of *Ocimum basilicum* resulted in a significant decrease in eye blinking and buccal oscillations compared with the control group. The analgesic activity observed with the plant extract may be attributed to the presence of flavonoids, phenolic compounds, and essential oils that interfere with inflammatory mediators such as prostaglandins.

The analgesic effect produced by *Ocimum basilicum* was comparable to that of the standard drug. Previous studies have reported that *Ocimum* species possess cyclooxygenase inhibitory activity and antioxidant potential, which may contribute to pain suppression. The current findings therefore support the traditional medicinal use of *Ocimum basilicum* as a natural analgesic agent. The study also demonstrates the suitability of *Rana tigrina* as an experimental model for evaluating analgesic activity without sacrificing the animal. Further studies involving phytochemical isolation, molecular mechanisms, and clinical evaluation are necessary to establish the therapeutic potential of the plant extract.

IV. CONCLUSION

The experimental animals showed a marked decrease in buccal oscillations and eye blinking. The Group II & III showed a decrease in eye blinking and buccal oscillations when compared to the control group after 30 mins. The decrease in pain is statistically significant and is comparable with that of standard group. In the present study, the analgesic activity of the ethanolic leaf extract of *Ocimum basilicum* in frogs was evaluated. The ethanolic leaf extract and aqueous extract of *Ocimum basilicum* significantly reduced the pain elevated in the body in a dose-dependent manner, and their effects are comparable to that of the standard analgesic drug, Paracetamol.

The present study confirms that ethanolic extract of *Ocimum basilicum* possesses significant analgesic activity in *Rana tigrina* frogs. The reduction in eye blinking and buccal oscillations indicates effective pain inhibition comparable to paracetamol. The analgesic property may be associated with phytoconstituents such as flavonoids, alkaloids, and volatile oils. The findings support the traditional use of *Ocimum* species in pain management and encourage further investigations to isolate active constituents and determine their mechanisms of action.

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