

**ANALGESIC ACTIVITY OF ETHANOLIC EXTRACT OF *PORTIERIA HORNEMANNII* (LYNGBYE)
P. C. SILVA IN MANDAPAM, RAMANADHAPURAM, TAMIL NADU, INDIA**ATHI LAKSHMI S¹, JOHN PETER PAUL J^{2*}

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ABSTRACT

Objective: The present study intends to detect the analgesic activity of the ethanolic extract of *Portieria hornemannii* collected from Mandapam, Ramanathapuram district, Tamil Nadu, India.

Methods: Diclofenac sodium (100 mg/kg) was the standard. The analgesic activity of *P. hornemannii* was predicted on intact rats by tail flick latency in the Tail Immersion Method. The various concentrations of the ethanolic extracts were used as 200 mg/kg and 400 mg/kg, considering the body weight of mice. The control group received a typical saline solution.

Results: The present study shows that the doses (200 mg/kg and 400 mg/kg body weight of mice) of the ethanolic extracts of *P. hornemannii* have brought out the analgesic activity.

Conclusion: The conclusion of the study is that the ethanolic extracts of *P. hornemannii* Silva at 400 mg/kg showed more effect than the 200 mg/kg ethanolic extract.

Keywords: Red algae, *Portieria hornemannii*, Ethanolic extract, Analgesic activity, Diclofenac sodium.

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INTRODUCTION

In recent years, the focus has been on finding natural drug sources rather than synthetic chemicals [1]. Macro algae are a rich source of bioactive substances used in medicine, including anticoagulant, antiprotozoal, antibacterial, antifungal, antiviral, antioxidant, anti-inflammatory, antipyretic, antipyretic, and analgesic. Analgesics are medicinal that is effective in relieving pain. Unlike other medications used as anesthesia during surgeries, these painkillers do not deactivate the nerves or alter the ability to perceive the environment or the consciousness. The present study aims to find out and confirm the analgesic effect of the ethanol extracts of *Portieria hornemannii*.

METHODS**Collection of samples**

P. hornemannii (XCH-20544), a species of red algae, is collected from Mandapam (Latitude: 9°16'48.00" N, Longitude: 79°07'12.00"E) in Ramanadhapuram district, Tamil Nadu, India, in August, 2021. The Samples were collected manually at low tide and cleaned with seawater to remove debris, and epiphytes. In the laboratory, the collected samples were washed using fresh water, followed by distilled water and kept in the refrigerator.

Preparation of ethanolic extract

To prepare the ethanolic extract, the collected plant samples were washed thoroughly, placed on tissue paper, and kept in the shade to dry at room temperature. The shade-dried samples were ground into fine powder using a tissue blender. 30 g powdered sample was placed in a Soxhlet apparatus and extracted with ethanol for 8 h. The excess ethanol evaporated, and the fine powder of crude ethanol was stored [2].

Experimental animals

Venkateswara Enterprises, Bangalore, Karnataka, India, provided Swiss albino mice (150–240 g). Before 1 week, the animals were housed in the departmental animal house under standard conditions (26±2°C and relative humidity 30–35%) in 12 h light and 12 h dark cycle, respectively, and provided with a regular rodent pellet diet. Diet composition is 10% protein, 4% *Arachis* oil, 1% fibers, 1% calcium, 1000 IU/g Vitamin A, and 500 IU/g Vitamin D. All the experiments were conducted between 10.00 h and 17.00 h by the ethical guidelines of the International Association for Study of Pain [3]. All experiments were performed between 10:00 a.m. and 5:00 p.m. in following with the ethical guidelines of the International Association for the Study of Pain [4]. The Committee for the Purpose of Control and Supervision of Experiments on Animals approved all the experiments. This study was approved for research purposes by the Institutional Animal Ethics Committee.

Experimental protocols

The experimental treatment was as follows:

- Group I: Control group animals Normal saline 5 mL/kg
- Group II: Diclofenac sodium (100 mg/kg) p.o.
- Group III: 200 mg/kg ethanolic extract p.o.
- Group IV: 400 mg/kg ethanolic extract p.o.

Analgesic activity by Tail immersion method

In the present study, analgesia was assessed according to the method of Luiz *et al.*, 1988 [3]. A 2–3 cm area of the tail was marked and thermostatically immersed in water, and maintained at 51°C. The time required to remove the tail from the hot water (in seconds) was recorded as the reaction time or latency of the tail movement. The maximum immersion time was 180 s to avoid damaging the tail

Table 1: Analgesic effect of ethanolic *Portieria hornemannii* (Lyngbye) P. C. Silva extract of by Tail Immersion method

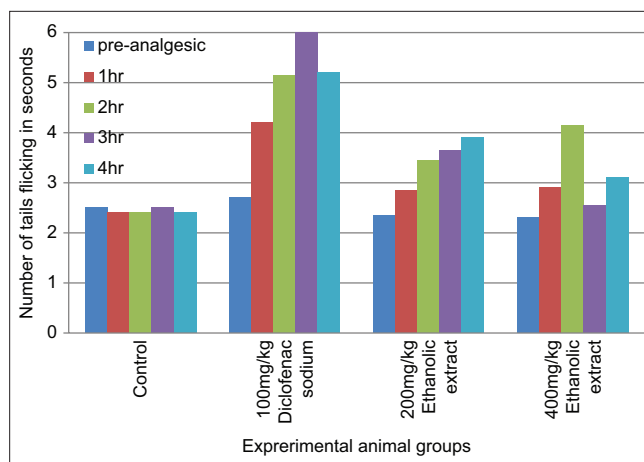
Groups	Pre-analgesic (seconds)	1 h (seconds)	2 h (seconds)	3 h (seconds)	4 h (seconds)
Control	2.5±0.40	2.4±0.38	2.4±0.41	2.5±0.40	2.4±0.10
100 mg/kg Diclofenac sodium	2.7±0.30	4.20±0.43	5.15±1.53	6.0±0.45	5.2±0.02
200 mg/kg Ethanolic extract	2.35±0.50	2.85±0.38	3.45±0.29	3.65±0.41	3.90±0.241
400 mg/kg Ethanolic extract	2.30±0.35	2.90±0.32	4.15±0.13	2.55±0.33	3.10±0.05

tissue. Control group animals received 0.2 mL of 0.9% NaCl solution. After that, the plant extracts, at doses of 200 and 400 mg/kg, were administered orally by intubation. The first measurements were taken immediately before the administration of the test and the standard medications, followed by, every 1 h, 2 h, 3 h, and 4 h after the administration. The criterion for the analgesia was a post-drug delay that was more significant than twice the average pre-drug delay reported by Janssen *et al.*, 1963 [5]. The difference in tail movement latency or the mean increase in latency measured after drug administration to indicate the analgesic effect produced by the test and the standard drug.

RESULTS AND DISCUSSION

In the tail immersion test, a standard analgesic drug (100 mg/kg Diclofenac sodium) and the ethanolic extract of *P. hornemannii* received in doses (200 and 400 mg/kg), showed a significant reduction in the number of tail flicks in mice compared to the control group mice. The control group, which administered painkillers for 1 h, 2 h, 3 h, and 4 h, showed that the reaction time of tails immersed in hot water in one second was 2.5±0.40, 2.4±0.38, 2.4±0.41, 2.5±0.40, and 2.4±0.10, respectively. The corresponding mean volumes in the Diclofenac sodium (100 mg/kg) were 2.7±0.30, 4.20±0.43, 5.15±1.53, 6.0±0.45, and 5.2±0.02, indicating a significantly analgesic effect of Diclofenac sodium as early as 1 h when compared to the control group rats. The ethanolic extract of *P. hornemannii* in both the doses of 200 mg/kg and 400 mg/kg had formed a substantial increase in hot water reaction time depending upon the hour duration, which varies from 1 h to 4 h. 200 mg/kg ethanolic extract of *P. hornemannii* took 3.90±0.41 s, whereas the 400 mg/kg ethanolic extract showed 3.10±0.05 s in 4 h. The ethanolic extract of *P. hornemannii* at 400 mg/kg found to have more effect than 200 mg/kg ethanolic extract. The ethanolic extract of *P. hornemannii* in both doses, 200 mg/kg and 400 mg/kg, also produced a significant analgesic effect with the mean hot water reaction time in a dose-dependent manner (Table 1 and Fig. 1).

The present study is the first report to demonstrate the analgesic activity of ethanolic extract of *P. hornemannii*, which produced in appropriate animal models (Tail Immersion Model). Red algae are considered the most important source of many biologically active metabolites. However, there are relatively few studies demonstrating the possible analgesic agents found in brown and green algae. Many studies have shown biological activities of polar algal fractions, and similar results were obtained in the present study. The data showed that the ethanolic extract of the red alga *P. hornemannii* exerts a dose-dependent analgesic effect. The search for new metabolites from marine organisms has led to the isolation of some compounds as terpenes, peptides, and sulfated-carbohydrates which have analgesic effects [4,6,7]. The analgesic activity observed may be associated with such compounds and other secondary metabolites in the ethanolic extracts. In the earlier report, it was explained that the methanolic extract of both doses of *Dictyopteris australis* had potent analgesic activity. In the previous observations, 200 mg/kg methanolic extract of *D. australis* was taken 5.75±0.47 s in 3 h, while the 400 mg/kg showed 3.25±0.22 s in 2 h. It was found that the methanolic extract of *D. australis* at 200 mg/kg was more effective than at 400 mg/kg [8].

**Fig. 1: Analgesic activity of ethanolic extract of *Portieria hornemannii* (Lyngbye) P. C. Silva**

CONCLUSION

From the study carried out, it can be concluded that the ethanolic extract of *P. hornemannii* has both central and peripheral analgesic properties. In future experiments, studies can be performed using purified extract fractions for further pharmacological and toxicological characterization, such as studies on mechanisms related to the central and peripheral analgesic effects.

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AUTHORS' CONTRIBUTIONS

All the authors have contributed equally.

CONFLICTS OF INTERESTS

The authors declare that they have no conflicts of interest.

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Nil.

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