

## Assessment of *Crinum Solapurense* Leaf Extract's Analgesic and Anti-Inflammatory Properties in Mice

Dhange A.A.<sup>1\*</sup>, Dr. Gajeli G. B<sup>1</sup>, Dr. Ghurghure S.M<sup>2</sup> Dr. Bobade C. D<sup>2</sup> and Dr. Kalshetti P.D<sup>3</sup>

<sup>1</sup>*D.S.T.S. Mandal's College of Pharmacy, Solapur, (Maharashtra) India*

<sup>2</sup>*School of Pharmacy, MIT Vishwapravag University, Solapur*

<sup>3</sup>*School of Health Science and Technology, Dr. Vishwanath karad MIT World Peace University, Pune, (Maharashtra) India*

<sup>3</sup>*PES Modern College of Pharmacy, Nigdi, Pune, (Maharashtra) India*

<sup>1</sup>*\*anupdhnage16@gmail.com*

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### ABSTRACT

*Crinum Solapurense*, also referred to as "Sudershana," belongs to the Amaryllidaceae family. Currently current medications for the treatment of pain, fever, and inflammation-like disorders have a lot of negative side effects; therefore, safer medications with few or no side effects are needed. This was accomplished by screening *Crinum Solapurense* (Amaryllidaceae) leaves for pharmacological qualities, particularly analgesic ones, utilizing the Paw edema test method with mice and test hotplate method. When compared to the common medication, Pentazocin and Ibuprofen, the ethanolic extract of *Crinum Solapurense* leaves had shown substantial analgesic and anti-inflammatory action. The analgesic and anti-inflammatory properties of many medicinal plants are typically attributed to tannins, flavonoids, alkaloids, and saponins; for this reason, phytoconstituents derived from plant leaves are also being investigated. These findings might help to the activities the plant *Crinum Solapurense*, which is distributed in the Solapur district, is used to treat pain and related conditions.

**Keywords:** *Crinum Solapurense*, Ethanolic extract, Hot plate method, Paw edema

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### INTRODUCTION

The goal of the current study is to determine the possible traits of medicinal plants found in the Solapur district. The district's plains of the Bhima, Sina, and Man Rivers are primarily agricultural area with a wealth of natural resources. The district's grasslands are distinctive and well-known for their variety of birds. These grasslands are home to the Indian Bastard. The district of Solapur has 125 families of blooming plants. Taxonomic work mostly reports on the families Fabaceae, Poaceae, Euphorbiaceae, Apocynaceae, Solanaceae, and Amaryllidaceae.<sup>1</sup>

The Amaryllidaceae is a broad family of ground-dwelling, monocotyledonous, bulbous flowers. It is abundantly found in both tropical and temperate regions. There are roughly 1310 species and 90 genera in it. Researchers are interested in the particular alkaloids that this plant produces and their pharmacological activities are intriguing. The Amaryllidaceae family of plants is beneficial for the discovery of new drugs.<sup>1</sup>

The renowned *crinum* species is well-known for its traditional medicinal uses. Tropical Africa, America, Asia,

and Australia are home to the Amaryllidaceae pantropical genus *Crinum L.* Southern Africa's most diversified genus. In the Indian states of Kerala, Karnataka, Gujarat, Assam, Manipur, and Maharashtra, it can be found in swamps that border rivers. The plant grows in Maharashtra along the Bhima River between Machnur Village in the Solapur District and the western three ghats. William Roxburgh's conducted extensive research on *Crinum* in India, reporting 14 species from British India. Nine species of *Crinum* are typically grown.<sup>2-18.</sup>

In *Crinum* species, almost 200 structurally unique alkaloid entities have been identified. Since these alkaloids are isolated from the Amaryllidaceae family, they are commonly referred to as "Amaryllidaceae Alkaloids." The biological activity of amaryllidaceae alkaloids is diverse and includes antimalarial, cancer, viral, and nervous system effects. It also has ant rheumatic and antiviral properties. Two important alkaloids that were separated from Amaryllidaceae plants are lycorine and galantamine.<sup>4</sup>

*\*Author for Correspondence: anupdhnage16@gmail.com*

**MATERIALS AND METHODS**

**Materials**

**Plant material:** The Botanical Survey of India in Pune gathered and botanically identified aerial portions of the plant *Crinum Solapurense*. BSI/WRC/Iden. Cer. 2023/2202230040519 is the specimen number.

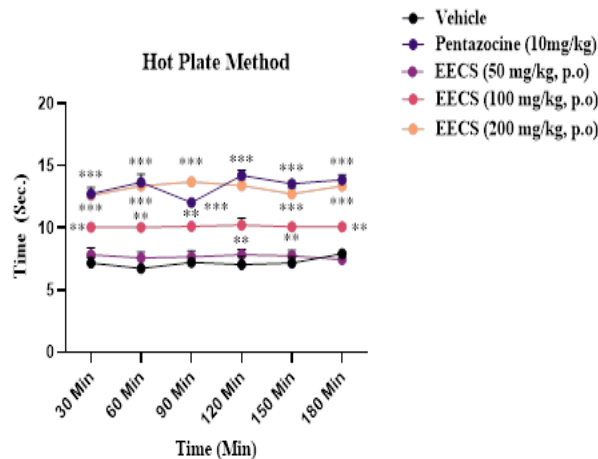
**Preparation of Plant extract:** Before being milled into a coarse powder, *Crinum Solapurense* leaves were left to air dry in the shade under normal environmental conditions. Petroleum ether, ethanol, acetone, methanol, hydro alcoholic, and aqueous solvents are examples of organic solvents that are used in this process. The powdered material was put through the Soxhlet apparatus and then extracted one after the other. The maceration procedure was used to perform the hydro alcoholic and aqueous extractions<sup>4</sup>. These extracts were then screened for active components using phytochemicals, and for the current study, an ethanolic extract was utilized.

**Animals:** Young Swiss-albino mice of either sex, weighing an average of 20–25 g, and aged 4-5 weeks were used in the experiment. They were kept under standard conditions for a week after purchase to acclimate, with food and water constantly accessible, at 24.0±0°C, 55-65% relative humidity, and with a 12-hour light/12-hour dark cycle. The standards for animal experimentation were approved by the institutional animal ethics committee. (MCP/IAEC/019/2024, IAEC No.)

**Analgesic activity:** Eddy's hot plate technique was used to screen for analgesic efficacy in ethanolic extract of *Crinum Solapurense*.

**Hot-plate test:**

The animals were kept at 55±0.5 °C on Eddy's hot plate. In order to prevent paw damage, a 15-second cut-off time was observed.<sup>8</sup> The animals' reaction times were measured when they licked their front or rear paws or leaped before and 0, 30, 60, 90, 120, 150, and 180 minutes after the samples were given orally<sup>9,10,11</sup>. Predrug reaction time is 0 min. Each of the two sexes of mice was split up into four groups of six mice. As a control group, the first group was given merely the vehicle (2% DMF); the second group was given the conventional medication Pentazocin (10 mg/kg, IP) dissolved in the vehicle. Ethanolic extracts (50,10, and 200 mg/kg, i.p.) were administered to the animals in the III, IV, and V groups.



**Figure 1.** Effect of Ethanolic Extract of *Crinum Solapurense* by Hot plate method

**Table 1:** Comparison of analgesic activity of *Crinum Solapurense* with standard (Pentazocin)

Time	Group I	Group II	Group III	Group IV	Group V
	Control	Standard	Test	Test	Test
	Vehicle	Pentazocin (10mg/kg)	EECS (50 mg/kg, p.o)	EECS (100 mg/kg, p.o)	EECS (200 mg/kg, p.o)
30 Min	7.17 ± 0.19	12.73 ± 0.22	7.83 ± 0.23	10.05 ± 0.09	12.60 ± 0.07
60 Min	6.73 ± 0.07	13.67 ± 0.27	7.58 ± 0.20	10.03 ± 0.09	13.37 ± 0.06
90 Min	7.22 ± 0.10	12.03 ± 0.13	7.67 ± 0.21	10.12 ± 0.12	13.70 ± 0.12
120 Min	7.05 ± 0.26	14.22 ± 0.17	7.83 ± 0.18	10.22 ± 0.23	13.40 ± 0.21
150 Min	7.17 ± 0.21	13.55 ± 0.16	7.75 ± 0.19	10.08 ± 0.09	12.73 ± 0.20
180 Min	7.92 ± 0.07	13.87 ± 0.17	7.47 ± 0.20	10.08 ± 0.09	13.37 ± 0.06

**Anti-inflammatory activity:** Carrageenan-induced paw edema in mice<sup>8</sup>.

Prior to testing, all animals were fasted for eighteen hours. Each group was given the experimental solutions orally one hour prior to the carrageenan injection, and the experiment lasted for six hours.

Group-I: Control Carrageenan group C (n=6): Physiological water is NaCl (0.9%).

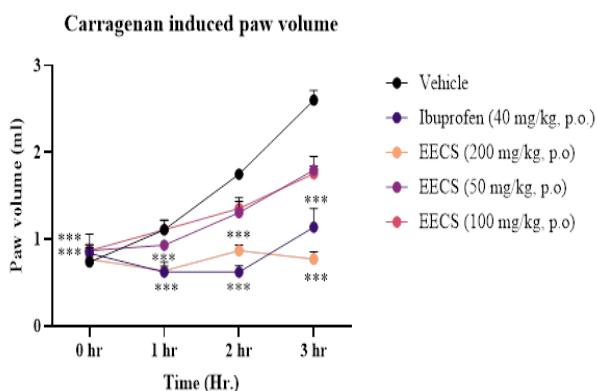
Group-II: Standard group St (n=6): An anti-inflammatory medicine (Ibuprofen dissolved in NaCl 0.9% with a concentration of 10ml/kg) was specified.

Group-III (n=6): Ethanolic extract of *Crinum Solapurense* (50 mg/Kg, dissolved in NaCl 0.9%).

Group-IV (n=6): Ethanolic extract of *Crinum Solapurense* (100mg/Kg, dissolved in NaCl 0.9%).

Group-V (n=6): Ethanolic extract of *Crinum Solapurense* (200mg/Kg, dissolved in NaCl 0.9%).

Each animal in every group received 0.1 ml of a 0.1% carrageenan, a high-molecular-weight polysaccharide-induced paw edema model, via sub-plantar injection in the right hind paw one hour after the treatments were administered.<sup>9, 10, 11</sup>



**Figure 2.** Effect of Ethanolic Extract of *Crinum Solapurense* by of Carrageenan induced paw edema

**Table 2:** Comparison of anti-inflammatory activity of *Crinum Solapurense* with standard (Ibuprofen)

Time	Group I Control	Group II Standard	Group III Test	Group IV Test	Group V Test
	Vehicle	Ibuprofen (40 mg/kg, p.o.)	EECS (50 mg/kg, p.o)	EECS (100 mg/kg, p.o)	EECS (200 mg/kg, p.o)
0 hr	0.74 ± 0.13	0.84 ± 0.03	0.87 ± 0.03	0.77 ± 0.03	0.87 ± 0.03
1 hr	1.11 ± 0.05	0.62 ± 0.03	0.93 ± 0.02	0.64 ± 0.04	1.11 ± 0.05

2 hr	1.75 ± 0.02	0.69 ± 0.03	1.31 ± 0.05	0.87 ± 0.03	1.35 ± 0.05
3 hr	2.60 ± 0.05	1.14 ± 0.09	1.80 ± 0.06	0.77 ± 0.03	1.75 ± 0.04

**Observations and Statistical analysis:**

The full experiment's means ± S.E.M. were used to present the results. An ANOVA was utilized to ascertain statistical significance between the groups.

**RESULTS AND DISCUSSION:**

This study shows that *Crinum Solapurense* has analgesic and anti-inflammatory properties. The impact of ethanolic extracts of *Crinum Solapurense* on the possible duration of paw licking in response to thermal stimulation is depicted in Fig. 1. The rats' leaking time increased after receiving 200 mg/kg, p.o. of *Crinum Solapurense*, according to the results, which demonstrated a substantial effect. The mean ± SEM is used to express all values. n=6 \*P<0.05, \*\*P<0.01, \*\*\*P<0.001 in comparison to the control group. A one-way ANOVA with multiple comparisons after Samples of Dunnett's tests. Figure 2 displayed the anti-inflammatory activity data, showing that the control group saw an increase in oedema, which is caused by carrageenan in mice. Paw volume decreased little after treatment with an ethanolic extract of *Crinum Solapurense*, but significantly after treatment with 200 mg/kg. All values are expressed as mean ±SEM. n=6, \*P<0.05, \*\*P<0.01, \*\*\*P<0.001 as compared to control group. One way ANOVA followed by multiple comparison Dunnetts test samples.

**CONCLUSION**

The analgesic effects of the ethanolic extracts may be induced by inhibiting the generation of inflammatory mediators or halting the transmission of inflammatory signals.. In the hot-plate paradigm, the activation of central nociceptive activity, which is mediated at the supraspinal level, causes pain perception. According to the study's findings, an ethanolic extract of *Crinum Solapurense* leaves has analgesic and anti-inflammatory properties. These results lend credence to *Crinum Solapurense* folklore usage.<sup>12</sup>

**CONFLICT OF INTEREST:** Regarding this research activity, the authors have no conflicts of interest.

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**Abbreviations:**

DMF- dimethylformaamide; EECS- Ethanolic Extract of *Crinum Solapurense*; i.p- intra peritoneal; o.p-per oral administration

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