

Time-Dependent Antipyretic Activity of Ethanolic Extract of *Clerodendrum viscosum* Leaves in Baker's Yeast-Induced Pyrexia in Wistar Albino Rats

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Received: 18th Sep, 2025; Revised: 28th Oct 2025; Accepted: 18th Nov, 2025; Available Online: 1st December, 2025

ABSTRACT

Background: Fever is a natural defense mechanism characterized by elevated body temperature due to infection or inflammation. The yeast-induced pyrexia model in rats is a reliable method to evaluate the antipyretic potential of new agents. *Clerodendrum viscosum*, a medicinal plant known for its anti-inflammatory, antioxidant, and hepatoprotective activities, was investigated in this study for its antipyretic effect.

Objective: The study aimed to assess the antipyretic activity of the ethanolic extract of *Clerodendrum viscosum* leaves (EELCV) at different doses and time intervals in Wistar albino rats using the Baker's yeast-induced pyrexia model.

Materials and Methods: Pyrexia was induced in rats by intraperitoneal injection of Baker's yeast (0.135 mg/kg). The animals were divided into five groups: control (1% gum acacia), standard (Paracetamol 100 mg/kg), and three test groups receiving EELCV at doses of 75, 150, and 300 mg/kg orally. Rectal temperatures were recorded at 0, 30, 60, 90, 120, 180, and 240 minutes after drug administration.

Results: The control group maintained elevated rectal temperature throughout the experiment. Paracetamol significantly ($p < 0.01$) reduced body temperature within 30 minutes. EELCV at 75 mg/kg showed no significant reduction ($p > 0.05$), whereas the 150 mg/kg dose produced moderate antipyretic activity ($p < 0.05$) at 180 minutes. The 300 mg/kg dose showed a significant reduction in temperature at multiple time points ($p < 0.05$), comparable to Paracetamol.

Conclusion: The ethanolic extract of *Clerodendrum viscosum* leaves demonstrated dose-dependent antipyretic activity, with the 300 mg/kg dose showing maximum efficacy. The observed effect may be attributed to the presence of flavonoids and phenolic compounds that inhibit prostaglandin synthesis in the hypothalamus

Keywords: *Clerodendrum viscosum*, Baker's yeast, Wistar albino rats, antipyretic activity, ethanolic extract, paracetamol

How to cite this article: Chandrashekar R, Shetty R, Bhat S, Chandrashekar R, Time-Dependent Antipyretic Activity of Ethanolic Extract of *Clerodendrum viscosum* Leaves in Baker's Yeast-Induced Pyrexia in Wistar Albino Rats Int J Drug Deliv Technol. 2026;16(1): 55-58. DOI: 10.25258/ijddt.16.1.6

Source of support: Nil.

Conflict of interest: None

INTRODUCTION

Fever is a common physiological response to infection or inflammation, characterized by an elevation in body temperature¹. In experimental pharmacology, inducing pyrexia in animals is essential for studying the mechanisms of fever and evaluating antipyretic interventions². One widely used model involves the administration of Baker's yeast, which stimulates the production of endogenous pyrogens and leads to a reproducible increase in body temperature in rodents, particularly Wistar albino rats³. This model is considered reliable because it mimics aspects of human fever and allows assessment of the temporal dynamics of the febrile response⁴. The yeast-induced pyrexia model involves measuring rectal temperature at various time intervals after yeast administration, which provides insights into the onset, intensity, and duration of the induced fever⁵. It has been extensively used in preclinical research to investigate both synthetic and natural antipyretic agents, as well as to understand the

physiological pathways involved in fever⁶. Recent studies have explored the antipyretic activity of different herbal extracts using the yeast-induced pyrexia model. For instance, the ethanolic extract of *Moringa oleifera* exhibited significant antipyretic effects in rats, with the onset of action observed within 30 minutes and lasting up to 12 hours⁷. Similarly, aqueous leaf extracts of *Luffa cylindrica* demonstrated notable antipyretic properties⁸.

In addition, *Piper betle* leaf extract was shown to reduce fever effectively, likely through modulation of pro-inflammatory mediators⁹. Furthermore, the yeast-induced pyrexia model has been used to study the antipyretic mechanism of *Gardeniae Fructus*, indicating its potential to regulate prostaglandin-mediated fever pathways¹⁰. *Clerodendrum viscosum* is a medicinal plant widely used in traditional medicine due to its diverse pharmacological activities¹¹. Studies have shown that the leaves of *C. viscosum* possess significant anti-inflammatory and antioxidant properties, which help in reducing oxidative

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stress in various tissues¹². Its hepatoprotective effects have been demonstrated in experimental models, where leaf extracts mitigated liver damage caused by toxic agents like lead^{12,13}. Furthermore, *C. viscosum* exhibits neuroprotective activity, reducing cognitive impairment and anxiety-like behaviour induced by neurotoxins in rats¹⁴.

The plant also shows potential anticancer activity, with leaf extracts exerting cytotoxic effects on different cancer cell lines^{13,15}. Traditionally, *C. viscosum* has been used to manage diabetes, infections, and inflammatory conditions, highlighting its broad therapeutic potential^{11,15}.

MATERIALS AND METHODS

Prior to initiating the study, approval was obtained from the Institutional Ethics Committee (Ref. No. YU/IAEC/3/10, dated 06/05/2010). All experimental procedures were conducted in accordance with the guidelines established by the Committee for the Control and Supervision of Experiments on Animals (CCSEA), New Delhi, India. Wistar albino rats were randomly divided into five groups, with ten rats in each group (n = 10).

Wistar Albino rats were divided into five groups of 10 rats each and were deprived of food and water for 24 hr prior to the experiment. The test was performed by injecting Baker's yeast 0.135mg/kg i.p, to induce pyrexia. Rectal temperature of each animal was taken before and 24h after the yeast injection using digital clinical thermometer. Basal Body Temperature (BBT) was recorded for each animal. Animals that did not show a minimum increase of 0.5°C in temperature 24th hour after yeast injection were rejected. The selected and grouped animals were treated orally with 1 % Gum acacia (3ml/kg, orally), Paracetamol (100 mg/kg orally) served as reference standard, Ethanolic extract of Leaves of *Clerodendrum viscosum* (75, 150 and 300mg/kg, orally) respectively served as test group.

The rectal temperature of each animal was recorded again at 0, 0.5, 1, 1.5, 2, 3 and 4th hour after treatment. Antipyretic effect was rated as the ability of test drug to reverse yeast induced pyrexia. Percentage reduction in body temperature of rats was calculated for the rat on one occasion using the control group temperatures.

RESULTS AND DISCUSSION

I	Control (1 % Gum acacia) 10 ml/kg, p. o	37.69± 0.19	38.54± 0.21	38.44 ±0.14	38.59± 0.15	38.4 7±0. 18	38.42±0 .10	38.33±0 .14	38.37±0.1 4
II	Standar- d (Paracet amol) 100mg/k g, p. o	37.38± 0.15	38.52± 0.16	37.43 ±0.09 (p<0. 01)	36.75± 0.16 (p<0.01)	37.4 ±0.0 8 (p<0. 01)	37.17±0 .10 (p<0.01)	37.19±0 .18 (p<0.01)	37.38±0.0 9 (p<0.01)
III	EELCV 75 mg/kg, p. o	37.36± 0.22	38.97± 0.39	38.31 ±0.22 (p>0. 05)	38.6±0. 11 (p>0.05)	38.6 ±0.1 1 (p>0. 05)	38.27±0 .13 (p>0.05)	38.3±0. 17 (p>0.05)	38.25±0.1 8 (p>0.05)
IV	EELCV 150mg / kg, p. o	36.99± 0.21	38.61± 0.24	38.42 ±0.12 (p>0. 05)	38.42± 0.16 (p>0.05)	38.5 6±0. 13 (p>0. 05)	37.73±0 .24 (p<0.05)	38.23±0 .23 (p>0.05)	38.17±0.2 3 (p>0.05)
V	EELCV 300 mg/kg, p.o	36.9±0. 28	38.44± 0.14	37.89 ±0.23 (p<0. 05)	37.89± 0.23 (p<0.05)	37.8 9±0. 23 (p<0. 05)	37.66±0 .20 (p<0.05)	38.36±0 .12 (p>0.05)	38.38±0.1 5 (p>0.05)
<p>The observations are mean ± S.E.M. p> 0.05-Not Significant, p<0.05- Significant, p< 0.01-Highly Significant as compared to control. ANOVA followed by Dunnett's multiple comparison test.</p> <p>EELCV- Ethanolic Extract of the leaves of <i>Clerodendrum viscosum</i>, BBT-Basal Body Temperature, p.o- per oral</p>									

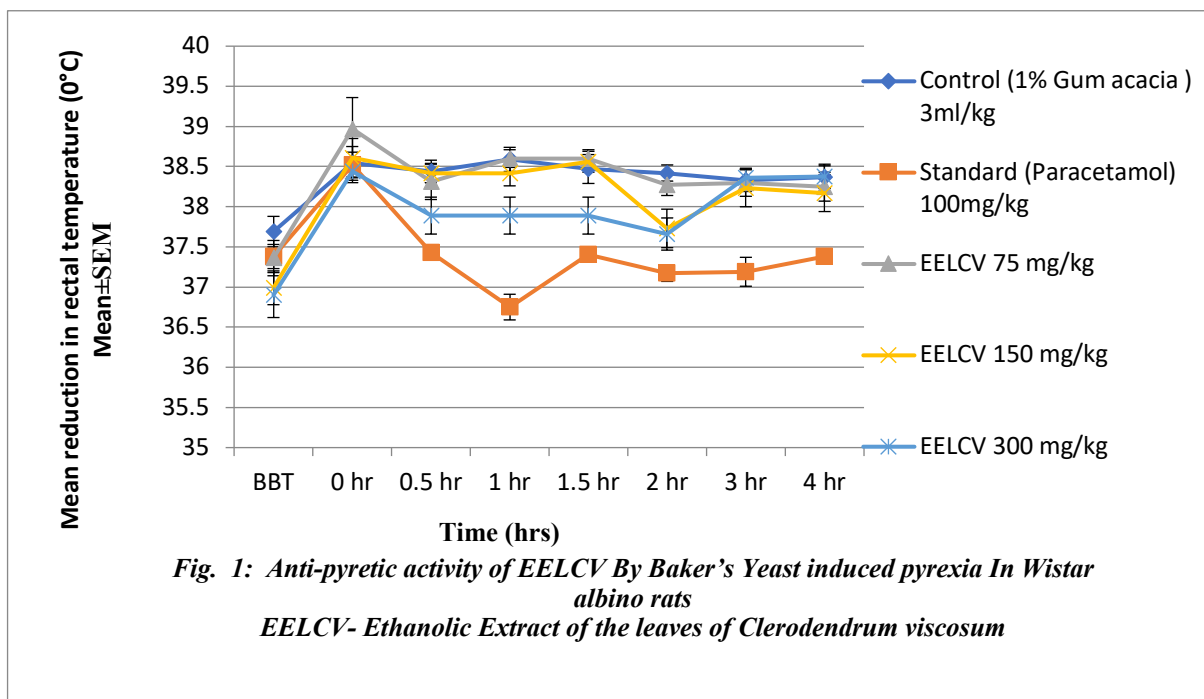


Fig. 1: Anti-pyretic activity of EELCV By Baker's Yeast induced pyrexia In Wistar albino rats
EELCV- Ethanolic Extract of the leaves of *Clerodendrum viscosum*

The present study evaluated the anti-pyretic activity of EELCV at doses of 75, 150, and 300 mg/kg using the Baker's yeast-induced pyrexia model in Wistar albino rats. The basal body temperature (BBT) of all groups increased after administration of Baker's yeast, indicating successful induction of pyrexia. The control group (1% gum acacia) maintained elevated rectal temperatures throughout the study period, reflecting the expected febrile response. Paracetamol (100 mg/kg) served as the standard reference and significantly reduced rectal temperature from 30 minutes onwards ($p < 0.01$), confirming its established antipyretic effect. Among the EELCV-treated groups, the 75 mg/kg dose did not produce a statistically significant reduction in temperature ($p > 0.05$), suggesting a sub-therapeutic effect at this dose.

Interestingly, the 150 mg/kg dose demonstrated a modest reduction in rectal temperature, with significance observed at the 180-minute interval ($p < 0.05$), indicating a dose-dependent anti-pyretic effect. The 300 mg/kg dose exhibited a more pronounced and significant reduction in temperature at 60, 90, 120, and 180 minutes ($p < 0.05$), comparable to the effect of paracetamol, although the maximal effect was slightly delayed. This suggests that EELCV possesses dose-dependent anti-pyretic activity, with higher doses achieving more consistent fever reduction.

The anti-pyretic effect of EELCV can be attributed to the presence of bioactive constituents such as flavonoids, terpenoids, and phenolic compounds, which have been reported to inhibit the synthesis of prostaglandins in the hypothalamus, a key mediator of fever^{18,19,20,21}. Similar studies on *Clerodendrum viscosum* have reported hepatoprotective, anti-inflammatory, and neuroprotective

effects, supporting its systemic modulatory properties in febrile conditions^{22,23,24}.

Overall, these findings indicate that EELCV has a significant dose-dependent antipyretic effect in Baker's yeast-induced pyrexia, with 300 mg/kg demonstrating maximum efficacy. The delayed onset compared to paracetamol may reflect the difference between phytochemical-mediated and synthetic antipyretic mechanisms. These results are in agreement with earlier reports on the pharmacological potential of *Clerodendrum viscosum* in experimental models of inflammation and fever.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the staff of the Department of Pharmacology, Yenepoya Medical College, Yenepoya University, for their valuable support and assistance in facilitating the smooth conduct of this study.

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