International Journal of Pharmaceutics and Drug Research
ISSN: 2347-6346
Available online at http://ijpdr.com

Original Research Article

STUDY OF BIOACTIVE COMPOUND AND ANTI-PYRETIC ACTIVITY OF HYDROALCOHOLIC EXTRACT OF *SOYMIDA FEBRIFUGA*

Prince Sonare*, Vishal Shrivastava, Akhlesh Kumar Singhai
School of Pharmacy, LNCT University, J K Town, Kolar Road, Sarvadharam C Sector, Bhopal, Madhya Pradesh, India-462042

***Correspondence Info:**
Prince Sonare
School of Pharmacy, LNCT University, J K Town, Kolar Road, Sarvadharam C Sector, Bhopal, Madhya Pradesh, India-462042
Email:
princesonare786@gmail.com

***Article History:**

Received: 20/02/2026
Revised: 01/03/2026
Accepted: 18/03/2026

ABSTRACT

The present study was undertaken to investigate the bioactive constituents and evaluate the antipyretic activity of the hydroalcoholic extract of *Soymida febrifuga*. The plant extract was prepared using a hydroalcoholic solvent system, yielding 10.5% w/w extract. Preliminary phytochemical screening revealed the presence of various bioactive compounds including flavonoids, phenols, alkaloids, glycosides, tannins, saponins, and diterpenes. Quantitative estimation showed total flavonoid content of 0.68 mg/100 mg and total phenolic content of 0.92 mg/100 mg of dried extract. The antipyretic activity was evaluated using the Brewer's yeast-induced pyrexia model in experimental animals. The hydroalcoholic extract was administered at doses of 100 mg/kg and 200 mg/kg body weight, while paracetamol (150 mg/kg) was used as the standard drug. The extract exhibited a dose-dependent reduction in rectal temperature, with the higher dose (200 mg/kg) showing significant antipyretic activity comparable to the standard drug. The results suggest that the antipyretic effect of the extract may be attributed to the presence of flavonoids and phenolic compounds, which are known to inhibit prostaglandin synthesis. In conclusion, the hydroalcoholic extract of *Soymida febrifuga* possesses significant antipyretic activity and supports its traditional use as a febrifuge. Further studies are required to isolate and characterize the active constituents and to elucidate the precise mechanism of action.

Keywords: *Soymida febrifuga*, Antipyretic activity, Hydroalcoholic extract, Phytochemical screening, Flavonoids, Phenolic compounds, Brewer's yeast-induced pyrexia, Prostaglandin inhibition.

INTRODUCTION

Fever, clinically referred to as pyrexia, is a common physiological response to infection, inflammation, or tissue injury, characterized by an elevation in body temperature above the normal range (Ogoina, 2011). It is primarily mediated by endogenous pyrogens such as cytokines, which stimulate the synthesis of prostaglandins in the hypothalamus, leading to a rise in the thermoregulatory set point. Although conventional antipyretic drugs such as paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) are widely used, their prolonged use is often associated with adverse effects including gastrointestinal irritation, hepatotoxicity, and renal complications. This has driven the search for safer and more effective alternatives derived from natural sources (Fokunang *et al.*, 2018).

Medicinal plants have been an integral part of traditional healthcare systems for centuries and continue to serve as a valuable source of bioactive compounds with therapeutic potential. Among these, *Soymida febrifuga*

(family: Meliaceae), commonly known as Indian redwood, has gained attention due to its diverse pharmacological properties (Latif and Nawaz, 2025). The plant is widely distributed in tropical regions and has been traditionally used in the treatment of fever, inflammation, and infectious diseases. Various parts of the plant, particularly the bark, are known to contain biologically active constituents such as alkaloids, flavonoids, tannins, and limonoids, which contribute to its medicinal properties (Oguntibeju, 2018).

Phytochemical investigations have revealed that these bioactive compounds possess significant pharmacological activities, including anti-inflammatory, antioxidant, antimicrobial, and antipyretic effects (Narain *et al.,* 2019). The presence of such constituents suggests that *Soymida febrifuga* may exert its antipyretic action through the inhibition of prostaglandin synthesis or modulation of inflammatory mediators. However, despite its traditional use, there is a need for systematic scientific evaluation to validate its therapeutic efficacy and to identify the active principles responsible for its pharmacological effects (Singh *et al.,* 2022).

Hydroalcoholic extraction is widely employed for the isolation of a broad spectrum of phytoconstituents due to its ability to dissolve both polar and moderately non-polar compounds. This method enhances the yield and efficacy of plant extracts, making it suitable for pharmacological screening. Therefore, the present study aims to investigate the bioactive compounds present in the hydroalcoholic extract of *Soymida febrifuga* and to evaluate its antipyretic activity using appropriate experimental models.

MATERIALS AND METHODS

Materials

The study utilized bark of *Soymida febrifuga*, which was dried, powdered, and extracted using a hydroalcoholic solvent system. Analytical-grade chemicals and reagents were used for phytochemical screening and estimation of flavonoids and phenolic content. Brewer's yeast was used to induce pyrexia, while paracetamol served as the standard drug and distilled water as control. Healthy laboratory rats were used for evaluating antipyretic activity under standard experimental conditions.

Methods

Extraction by maceration method

50 gram shade dried leaves was coarsely powdered and subjected to extraction with petroleum ether by maceration process. The extraction was continued till the defatting of material had taken place. Defatted powdered of *Soymida febrifuga* has been extracted with hydroalcoholic solvent (ethanol: aqueous; 80:20v/v) using maceration process for 48 hrs, filtered and dried using vacuum evaporator at 40ºC (Mukherjee, 2007).

Determination of percentage yield

The yield of the collected plant extracts was measured in grams after extraction, and then converted into percentage. For calculating the percentage yield of selected plant products, formula following was introduced. By using the following formula the percentage yield of extract was calculated:

$$\text{Percentage yield} = \frac{\text{Weight of Extract}}{\text{Weight of powdered drug}} \text{x}100$$

Phytochemical screening

Medicinal plants are traditional pharmaceutical commodities and many of the current medicinal drugs are derived indirectly

from plants. Phytochemical materials consist of two main bioactive components (chlorophyll, vitamins, amino acids, sugar etc.) and secondary bioactive components; (Alkaloids, terpenoids, phenols, flavonoids etc.). Phytochemical examinations were carried out for extracts as per standard methods (Kokate, 1994; Khandelwal, 2005).

Estimation of total flavonoids content

Determination of total flavonoids content was based on aluminium chloride method (Mishra *et al.,* 2017). 10 mg quercetin was dissolved in 10 ml methanol, and various aliquots of 5-25µg/ml were prepared in methanol. 10mg of dried extracts of were dissolved in 10 ml methanol and filtered. 3 ml of this solution was used for the estimation of flavonoid. 1 ml of 2% $AlCl_3$ solution was added to 3 ml of extract or standard and allowed to stand for 15 min at room temperature; absorbance was measured at 420 nm.

Estimation of total phenolic content

The total phenolic content of the extract was determined by the modified folin-ciocalteu method. 10 mg Gallic acid was dissolved in 10 ml methanol, various aliquots of 10-50µg/ml was prepared in methanol. 10 mg of dried extract was dissolved in 10 ml methanol and filter. Two ml (1mg/ml) of this extract was for the estimation of phenol. 2 ml of extract and each standard was mixed with 1 ml of folin-ciocalteu reagent (previously diluted with distilled water 1:10 v/v) and 1 ml (7.5g/L) of sodium carbonate. The mixture was vortexed for 15s and allowed to stand for 10min for colour development. The absorbance was measured at 765 nm using a spectrophotometer (Niazi *et al.,* 2010).

***In vivo* anti-pyretic activity using brewer's yeast induced hyperthermia in rats**

Animals

Albino mice (25 -35 g) were used for acute toxicity study and Wistar rats, weighing 150-200 g were used for anti-pyretic study. The animals were kept in polypropylene cages in a room maintained under controlled atmospheric conditions. The animals were fed with standard diet (Hindustan liver, Mumbai, India) and had free access to clean drinking water. Pharmacological study was approved by Animal Ethical Committee.

Acute toxicity studies

In the acute toxicity test carried out in mice we take eight doses and 10 mice in each dose of hydroalcoholic extract of *Soymida febrifuga* i.e. 500, 1000, 1500 and 2000 mg/kg body weight. All groups of test drug showed neither any toxic effect nor any lethal effect in the dose range of 500 to 2000 mg/kg body weight (Cheng *et al.,* 2005).

Since no lethal or adverse effects were observed up to 2000 mg/kg, the extract can be considered practically non-toxic according to OECD guidelines 424. Therefore, for further pharmacological screening, lower therapeutic doses 100 mg/kg and 200 mg/kg body weight were selected as safe and appropriate working doses. These doses fall well below the maximum non-toxic limit, ensuring both safety and efficacy in subsequent studies.

Twenty four male rats were randomly allotted to four groups (6 animals per group). After measuring the rectal temperature of all the rats, hyperthermia was induced by subcutaneous injection of 20% (w/v) aqueous suspension of brewer's yeast. After 18 hours of yeast induction rectal temperatures were measured and only rats those show an increase in temperature by 0.7ºC and more

from baseline was used for the study (Hajare *et al.*, 2000).

Grouping of Animals

Groups I were assigned as vehicle control and administered with Water for Injection (10 ml/kg). Group II were administered with paracetamol (150mg/kg) and served as positive control. Groups III and IV were administered with hydroalcoholic extract of *Soymida febrifuga* at the dose of 100 and 200 mg/kg respectively.

Procedure

Pyrexia was induced in experimental animals using a subcutaneous injection of 20% (w/v) aqueous suspension of brewer's yeast. Prior to yeast administration, the normal rectal temperature of each rat was recorded using a digital thermometer. The animals were then fasted overnight with free access to water.

After 18 hours of yeast injection, the rectal temperature of each animal was recorded again to confirm the induction of pyrexia (this reading was considered as 0 hour). Only animals showing a significant rise in temperature were included in the study.

All treatments were administered orally using an appropriate feeding cannula. Following drug administration, rectal temperatures were recorded at 1, 2, 3, and 4 hours. The change in temperature was noted and compared among different groups to evaluate the anti-pyretic activity of the extract.

Statistical analysis

Data were analyzed using one way ANOVA followed by Dunnett T method as post-hoc test. All values were reported as mean ± SEM. Statistical significance was set at $p \leq 0.001$.

RESULTS AND DISCUSSION

The present study was designed to evaluate the phytochemical profile and antipyretic potential of the hydroalcoholic extract of *Soymida febrifuga*. The findings obtained from percentage yield, qualitative phytochemical screening, quantitative estimation of bioactive compounds, and pharmacological evaluation collectively support the therapeutic relevance of the plant in fever management.

The percentage yield of the hydroalcoholic extract was found to be 10.5% (Table 1)**,** indicating efficient extraction of phytoconstituents using a hydroalcoholic solvent system. This method is known to extract a wide range of polar and moderately non-polar compounds, which may contribute to the observed biological activity.

Phytochemical screening revealed the presence of several important bioactive constituents such as flavonoids, phenols, alkaloids, glycosides, tannins, saponins, diterpenes, proteins, and carbohydrates (Table 2)**.** Among these, flavonoids and phenolic compounds are particularly noteworthy due to their well-established antioxidant and anti-inflammatory properties, which play a crucial role in the modulation of fever. The presence of alkaloids and glycosides may also contribute to pharmacological activity, including inhibition of inflammatory mediators.

The quantitative estimation showed that the hydroalcoholic extract contains appreciable amounts of total flavonoids (0.68 mg/100 mg) and total phenolic content (0.92 mg/100 mg) (Table 3)**.** These compounds are known to inhibit cyclooxygenase (COX) enzymes and reduce prostaglandin synthesis, which is a key mechanism involved in the development of pyrexia. Thus, the

phytochemical composition supports the potential antipyretic activity of the extract.

The antipyretic activity was evaluated using the Brewer's yeast-induced pyrexia model**,** a well-established experimental model for assessing antipyretic agents. Yeast-induced fever is associated with increased production of prostaglandins, particularly PGE_2, in the hypothalamus. In this study, the standard drug paracetamol (150 mg/kg) produced a significant ($P < 0.001$) reduction in rectal temperature, confirming the validity of the experimental model (Table 4)**.**

The hydroalcoholic extract of *Soymida febrifuga* exhibited a dose-dependent antipyretic effect (Table 4)**.** At a dose of 100 mg/kg, the extract showed a moderate but significant reduction in rectal temperature at the 3rd hour ($P < 0.05$). However, at a higher dose of 200 mg/kg**,** the extract produced a more pronounced and statistically significant reduction in temperature, particularly at the 2nd, 3rd, and 4th hours ($P < 0.05$ *to* $P < 0.01$), indicating enhanced efficacy with increasing dose.

Although the antipyretic effect of the extract was slightly lower compared to paracetamol, it demonstrated a gradual and sustained reduction in body temperature (Table 4), suggesting a possible prolonged mechanism of action. This effect may be attributed to the synergistic action of phytoconstituents such as flavonoids, phenolics, and tannins, which are known to interfere with pyrogenic cytokines and prostaglandin biosynthesis.

Overall, the results of the study indicate that the hydroalcoholic extract of *Soymida febrifuga* possesses significant antipyretic activity, which may be mediated through the inhibition of prostaglandin synthesis and modulation of inflammatory pathways. The presence of bioactive phytoconstituents further supports its traditional use as a febrifuge.

However, further studies are required to isolate and characterize the specific active compounds responsible for the observed activity and to elucidate the precise mechanism of action at the molecular level.

Table 1: Percentage yield of *Soymida febrifuga* extract

S. No.	Extract	Percentage yield
1.	Hydroalcoholic	10.5%

Table 2: Phytochemical screening of extract of *Soymida febrifuga*

S. No.	Constituents	Hydroalcoholic extract
1.	**Alkaloids**	
	Mayer's Test	-ve
	Wagner's Test	+ve
	Dragendroff's Test	-ve
2.	**Glycosides**	
	Legal's Test	+ve
3.	**Flavonoids**	

	Lead acetate test Alkaline test	+ve +ve
4.	**Phenol** Ferric chloride test	 +ve
5.	**Proteins** Xanthoproteic test	 +ve
6.	**Carbohydrates** Molisch's Test Benedict's Test Fehling's Test	 -ve +ve +ve
7.	**Saponins** Froth Test	 +ve
8.	**Diterpenes** Copper acetate test	 +ve
9.	**Tannins** Gelatin Test	 +ve

[+ve= positive; -ve= negative]

Table 3: Estimation of total flavonoids and phenol content of extract of *Soymida febrifuga*

S. No.	Extract	Total flavonoids content (mg/ 100 mg of dried extract)	Total phenol content (mg/ 100 mg of dried extract)
1.	Hydroalcoholic	0.68	0.92

Table 4: Effect of hydroalcoholic extract of *Soymida febrifuga* on rectal temperature in different time intervals

Groups	Treatments	Dose (mg/kg b.wt.)	1 hour (°C)	2 hour (°C)	3 hour (°C)	4 hour (°C)
I	Water for Injection (WFI)	0	39.15 ± 0.12	39.20 ± 0.11	38.98 ± 0.09	38.80 ± 0.15
II	20% (w/v) Aqueous suspension of brewer's yeast + Paracetamol	150	38.45 ± 0.14	38.02 ± 0.16**	36.90 ± 0.13***	36.70 ± 0.10***
III	20% (w/v) Aqueous suspension of brewer's yeast + Hydroalcoholic extract of *Soymida febrifuga*	100	38.88 ± 0.20	38.52 ± 0.22	38.20 ± 0.20*	37.60 ± 0.20
IV	20% (w/v) Aqueous suspension of brewer's yeast + Hydroalcoholic extract of *Soymida febrifuga*	200	38.68 ± 0.19	38.30 ± 0.15*	38.05 ± 0.16*	37.05 ± 0.15**

Values are expressed as the mean ± SEM of six observations. *** P<0.001 vs. control treatment (One-way ANOVA followed by Dunnett's test)

CONCLUSION

The present study demonstrated that the hydroalcoholic extract of *Soymida febrifuga* contains a wide range of bioactive phytoconstituents, including flavonoids, phenolic compounds, alkaloids, glycosides, tannins, and saponins. The extract showed appreciable total flavonoid and phenolic content, which are known to contribute to various pharmacological activities.

The antipyretic evaluation revealed that the extract possesses significant, dose-dependent fever-reducing activity in the Brewer's yeast-induced pyrexia model. The higher dose (200 mg/kg) exhibited more pronounced effects, comparable to the standard drug paracetamol, indicating its potential efficacy as a natural antipyretic agent. The observed activity may be attributed to the presence of flavonoids and phenolic compounds, which are likely involved in the inhibition of prostaglandin synthesis and modulation of inflammatory mediators. The findings support the traditional use of *Soymida febrifuga* as a febrifuge and highlight its potential as a source of safe and effective antipyretic compounds.

DECLARATION OF INTEREST

The authors declare no conflicts of interests. The authors alone are responsible for the content and writing of this article.

REFERENCES

- Ogoina, D. (2011). Fever, fever patterns and diseases called 'fever'–A review. *Journal of Infection and Public Health, 4*(3), 108–124.
- Fokunang, C., Fokunang, E. T., Frederick, K., Ngameni, B., & Ngadjui, B. (2018). Overview of non-steroidal anti-inflammatory drugs (NSAIDs) in resource limited countries. *MOJ Toxicology, 4*(1), 5–13.
- Latif, R., & Nawaz, T. (2025). Medicinal plants and human health: A comprehensive review of bioactive compounds, therapeutic effects, and applications. *Phytochemistry Reviews*, 1–44.
- Oguntibeju, O. O. (2018). Medicinal plants with anti-inflammatory activities from selected countries and regions of Africa. *Journal of Inflammation Research, 11*, 307–317.
- Narain, N., Shanmugam, S., & de Souza Araujo, A. A. (2019). Antioxidant, antimicrobial, analgesic, anti-inflammatory and antipyretic effects of bioactive compounds from *Passiflora* species. In *Medicinal Plants: From Farm to Pharmacy* (pp. 243–274).
- Singh, A. K., Chandra, K. K., Kumar, R., & Bhardwaj, A. K. (2022). Phytochemical analysis and medicinal properties of *Soymida febrifuga* (Roxb.) A. Juss: A review. *Advances in Bioresearch, 13*(6), 37–43.
- Mukherjee, P. K. (2007). *Quality control of herbal drugs* (2nd ed., pp. 2–14). Business Horizons.
- Kokate, C. K. (Ed.). (1994). *Practical pharmacognosy* (4th ed., pp. 112–120). Vallabh Prakashan.

- Mishra, A. G., Singh, R., Meha, P., & Parkhe, G. (2017). Determination of total phenolic, flavonoid content, antioxidant and antimicrobial activity of *Gloriosa superba* seed extract. *Asian Journal of Pharmaceutical Education and Research, 6*(2), 12–17.
- Niazi, J., Gupta, V. V., Chakarborty, P., & Kumar, P. (2010). Anti-inflammatory and antipyretic activity of *Aleuritis moluccana* leaves. *Asian Journal of Pharmaceutical and Clinical Research, 3*(1), 35–37.
- Cheng, L., Ming-Liang, H., Lars, B., et al. (2005). Is COX-2 a perpetrator or a protector. Selective COX-2 inhibitors remain controversial. *Acta Pharmacologica Sinica, 26*, 926–933.
- Hajare, S. W., Chandra, S., Tandan, S. K., Sharma, J., Lal, J., & Telang, A. G. (2000). Analgesic and antipyretic activity of *Dalbergia sissoo* leaves. *Indian Journal of Pharmacology, 32*, 357–360.