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Research Article

**PHYTOCHEMICAL SCREENING AND ANALGESIC ACTIVITY
OF CHLOROFORM EXTRACT OF *ABRUS PRECATORIOUS*
LEAVES ON ALBINO RATS USING EDDY'S HOT PLATE
METHOD**

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Abstract:

Pain management remains a significant challenge in modern medicine, necessitating the exploration of alternative analgesic agents. This study evaluates the analgesic potential of Abrus precatorius extract using the Eddy's Hot Plate method in animal models. The extracts were prepared using chloroform, ethanol, and aqueous solvents and subjected to phytochemical screening. The analgesic effect was assessed in comparison with Diclofenac (10 mg/kg). The results demonstrated dose-dependent analgesic activity, with the 400 mg/kg dose exhibiting the highest efficacy. The study suggests that Abrus precatorius possesses promising analgesic properties, warranting further pharmacological investigation.

Keywords: *Abrus precatorius, analgesic activity, Eddy's Hot Plate method, Diclofenac, phytochemical screening+*

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INTRODUCTION:

Pain is an intricate biological and psychological experience triggered by actual or potential tissue damage. It serves as a critical warning system in the body, alerting individuals to potential harm. Pain can be categorized into acute and chronic types, each requiring different treatment approaches. While acute pain is usually short-lived and linked to injury or surgery, chronic pain persists for extended periods and can significantly impact quality of life.

Effective pain management remains a cornerstone of healthcare, with conventional treatments including nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, and adjuvant therapies. However, these treatments often come with adverse effects such as gastrointestinal distress, kidney dysfunction, addiction, and tolerance development. As a result, researchers have turned to medicinal plants as alternative or complementary options for pain relief.

Abrus precatorius, a member of the Fabaceae family, is traditionally used for various medicinal purposes, including pain relief. It contains bioactive compounds such as alkaloids, flavonoids, tannins, and saponins, which exhibit analgesic and anti-inflammatory properties. The present study aims to evaluate the analgesic potential of *Abrus precatorius* extracts using preclinical models and to compare its efficacy with Diclofenac, a standard analgesic drug.

PAIN MECHANISAM AND MANGAMENT:

Pain perception involves four key processes:

1. **Transduction** – The conversion of noxious stimuli into electrical signals by nociceptors.
2. **Transmission** – The conduction of pain signals from nociceptors to the central nervous system (CNS) via peripheral nerves.
3. **Modulation** – The enhancement or suppression of pain signals within the spinal cord.
4. **Perception** – The brain's interpretation of pain, influenced by psychological and emotional factors.

Various neurotransmitters regulate pain pathways, including excitatory mediators like glutamate and substance P, and inhibitory agents such as endorphins and gamma-aminobutyric acid (GABA). Current pain management strategies include both pharmacological and non-pharmacological approaches:

- **Pharmacological Approaches:** NSAIDs, opioids, corticosteroids, anticonvulsants, and antidepressants.
- **Non-Pharmacological Approaches:** Acupuncture, physical therapy, yoga, and cognitive behavioral therapy.

Despite their effectiveness, pharmacological treatments are often associated with side effects, necessitating the exploration of safer alternatives. Herbal medicine offers a promising avenue due to its multi-targeted mechanisms, lower risk of dependency, and fewer adverse effects.

MATERIALS AND METHODS:

Collection and Extraction of Plant Material:

Abrus precatorius was collected from Cherukupalli Village, Andhra Pradesh, authenticated by a botanist, and processed into chloroform, ethanol, and aqueous extracts using maceration.

MACERATION PROCEDURE:

1. **Preparation of Plant Material:** The dried plant material of *Abrus precatorius* was ground into a coarse powder using a mechanical grinder.
2. **Selection of Solvent:** Three different solvents—chloroform, ethanol, and distilled water—were used for extraction.
3. **Maceration Process:**
 - A known quantity of powdered plant material was soaked in each solvent in a 1:10 ratio (plant material to solvent).
 - The mixtures were placed in separate glass containers, tightly sealed, and left to macerate at room temperature for 72 hours.
 - Intermittent shaking was performed to enhance the extraction process.
4. **Filtration:** The macerated mixtures were filtered through Whatman No.1 filter paper to remove plant residues.
5. **Solvent Evaporation:** The filtrates were subjected to evaporation using a rotary evaporator under reduced pressure to obtain concentrated extracts.
6. **Storage:** The dried extracts were stored in airtight containers at 4°C for further phytochemical and pharmacological analysis. *Abrus precatorius* was collected from Cherukupalli Village, Andhra Pradesh, authenticated by a botanist, and processed into chloroform, ethanol, and aqueous extracts using maceration.

PHYTOCHEMICAL SCREENING:

Standard qualitative tests were conducted to identify glycosides, alkaloids, flavonoids, tannins, saponins, and phytosterols in the extracts. The phytochemicals present are known to contribute to various pharmacological activities, including analgesic and anti-inflammatory effects.

ACUTE TOXICITY STUDY:

Following OECD 423 guidelines, female Wistar albino rats were administered increasing doses (5–2000 mg/kg) of the extract to determine safety. Behavioural changes, food and water intake, and signs of toxicity were observed over 14 days.

EVALUATION OF ANALGESIC ACTIVITY:

The analgesic effect was assessed using Eddy's Hot Plate method in Swiss albino mice (25-30g). Animals were divided into four groups:

- **Group I:** Control (Saline)
- **Group II:** Diclofenac (10 mg/kg)
- **Group III:** Test extract (200 mg/kg)
- **Group IV:** Test extract (400 mg/kg)

Reaction time was recorded at 0, 1-, 2-, 3-, and 4-hours post-treatment. The percentage increase in reaction time was calculated to determine the effectiveness of the extract.

RESULTS AND DISCUSSION:**Phytochemical Screening:**

Phytochemical analysis confirmed the presence of analgesic-associated compounds such as alkaloids, flavonoids, tannins, and saponins. Flavonoids and alkaloids are known for their role in modulating pain pathways, while saponins and tannins have demonstrated anti-inflammatory effects in previous studies.

TABLE 1: Phytochemical Screening Results:

Phytochemical	Chloroform Extract	Ethanol Extract	Aqueous Extract
Glycosides	Present	Present	Present
Saponins	Present	Present	Present
Alkaloids	Present	Present	Present
Tannins	Present	Present	Absent
Flavonoids	Absent	Absent	Present
Carbohydrates	Present	Present	Present
Proteins	Present	Present	Present

ACUTE TOXICITY STUDY:

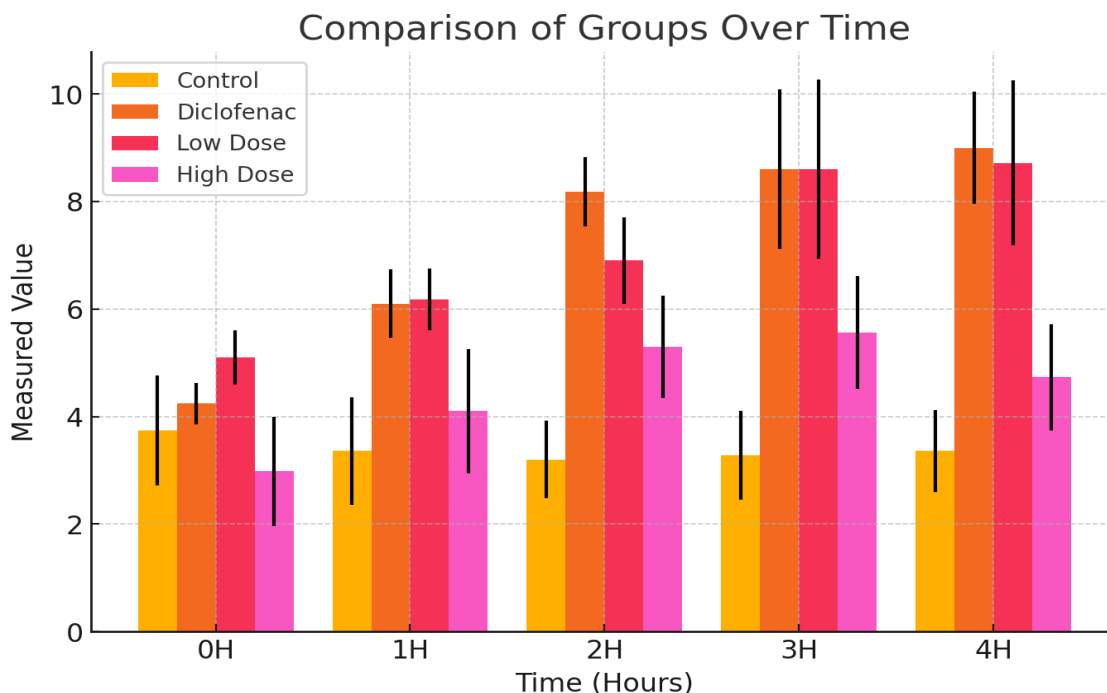
No mortality was observed up to 2000 mg/kg, suggesting the extract's safety for further studies. The absence of severe toxic symptoms indicates the potential of *Abrus precatorius* for medicinal use.

The reaction time significantly increased in treated groups compared to the control. The 400 mg/kg dose exhibited the highest analgesic activity, comparable to Diclofenac. Results showed that both low-dose (200 mg/kg) and high-dose (400 mg/kg) groups demonstrated significant improvement in pain tolerance, indicating dose-dependent efficacy.

ANALGESIC ACTIVITY:

The analgesic effects were compared to the control and standard groups:

Group	0H	1H	2H	3H	4H
Control	3.74 ± 1.02	3.36 ± 1.00	3.20 ± 0.72	3.28 ± 0.83	3.36 ± 0.76
Diclofenac	4.24 ± 0.39	6.10 ± 0.64	8.18 ± 0.64	8.60 ± 1.49	9.00 ± 1.05
Low Dose	5.10 ± 0.51	6.18 ± 0.57	6.90 ± 0.80	8.60 ± 1.67	8.72 ± 1.54
High Dose	2.98 ± 1.02	4.10 ± 1.15	5.30 ± 0.95	5.56 ± 1.05	4.73 ± 0.99



The results indicate that both low and high doses of *Abrus precatorius* extract significantly increased the reaction time in the hot plate test compared to the control group, demonstrating analgesic activity. The low-dose group showed a steady increase in reaction time, while the high-dose group exhibited a peak at 3 hours, followed by a slight decline at 4 hours. The standard drug, Diclofenac, showed the highest analgesic effect.

CONCLUSION:

Abrus precatorius extract demonstrated significant dose-dependent analgesic activity, with promising implications for pain management. The study suggests that the bioactive compounds present in the extract contribute to its analgesic potential. However, further studies, including molecular mechanism exploration and clinical trials, are necessary to establish its efficacy and safety in humans.

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