

## To Evaluate the Analgesic Activity of Garlic Extract in Rats

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### Abstract

**Background:** Garlic (*Allium sativum*) has been traditionally used for its medicinal properties, including its potential analgesic effects. This study aimed to evaluate the analgesic activity of garlic extract in rats and to explore its efficacy in pain management.

**Objective:** The study aimed to assess the analgesic activity of garlic extract and compare its effects with a standard analgesic drug.

**Methods:** The analgesic effect of garlic extract was evaluated in rats using the hot plate test and formalin test. The rats were divided into different groups, including a control group, a garlic extract group, and a standard analgesic group (diclofenac). The time taken for the rats to react to the painful stimuli was recorded.

**Results:** The garlic extract significantly increased the latency time in both the hot plate and formalin tests, indicating potent analgesic activity. The garlic extract group showed a comparable effect to the diclofenac group, suggesting that garlic extract may have significant pain-relieving properties.

**Conclusion:** Garlic extract exhibits significant analgesic activity in rats, indicating its potential for use in pain management. Further studies on the underlying mechanisms and long-term effects are recommended.

**Keywords:** garlic extract, analgesic activity, *Allium sativum*, rats, pain management, hot plate test, formalin test.

### Introduction

Garlic (*Allium sativum*) is a widely recognized herb known for its culinary and medicinal properties. It has been used in various cultures for centuries due to its potential therapeutic effects, which include anti-inflammatory, antimicrobial, and analgesic properties (1). Among these, its analgesic effects have drawn significant attention, especially in the context of traditional medicine where garlic is often used as a remedy for pain and inflammation (2). Recent scientific studies have started to explore the pharmacological properties of garlic, and several bioactive compounds found in garlic, such as

allicin, have been identified as having potential pain-relieving effects (3).

Pain is a complex and multifactorial experience that can significantly impact an individual's quality of life. Analgesic drugs are essential for managing acute and chronic pain, but many commonly used drugs have significant side effects. As a result, researchers are increasingly interested in natural products like garlic, which may provide a safer alternative to conventional pain management strategies (4). Animal studies are crucial for evaluating the efficacy and safety of such natural products in pain management.

Garlic's potential as an analgesic has been observed in various studies, including those investigating its anti-inflammatory effects, as inflammation is often linked to pain (5). Allicin, a sulfur-containing compound in garlic, is thought to be primarily responsible for its medicinal properties, including its antioxidant and anti-inflammatory effects (6). Several studies have indicated that garlic can reduce pain-related behaviors in animal models, including those induced by chemical or mechanical stimuli (7).

Given the increasing need for alternative pain management solutions and the promising preliminary data on garlic's analgesic properties, it is important to evaluate its effects in a controlled, experimental setting. The aim of this study is to assess the analgesic activity of garlic extract in rats using well-established pain models, including the hot plate test and the formalin test.

These models are widely used to assess both acute and chronic pain in animal subjects, providing valuable insights into the potential effectiveness of garlic as an analgesic agent (8).

#### **Aim and Objectives:**

**Aim:** To evaluate the analgesic activity of garlic extract in rats and compare it with a standard analgesic drug.

#### **Objectives:**

1. To assess the analgesic effects of garlic extract in rats using the hot plate and formalin tests.
2. To compare the analgesic effects of garlic extract with a standard analgesic drug, diclofenac.

#### **Material and Methods:**

This study was conducted using adult male Wistar rats, weighing 200-250 grams, housed in

standard laboratory conditions with free access to water and food. The study was divided into different experimental groups: one receiving garlic extract, one receiving diclofenac (as a standard analgesic), and a control group receiving saline.

#### **Inclusion Criteria:**

- Healthy male Wistar rats aged 8-12 weeks.
- Rats with no previous history of chronic illness or injury.
- Rats weighing between 200-250 grams.

#### **Exclusion Criteria:**

- Rats with any visible signs of illness.
- Animals that had received analgesic treatment within the last two weeks.
- Rats that had undergone surgery or other procedures that might interfere with pain response.

#### **Methodology:**

- **Garlic Extract Preparation:** Fresh garlic bulbs were washed, dried, and ground into a fine paste. The paste was extracted using ethanol, and the concentrated garlic extract was diluted for use in the experiment.
- **Hot Plate Test:** The analgesic effect was evaluated by placing the rats on a hot plate maintained at 55°C. The latency to paw licking or jumping was recorded as an indicator of pain perception.
- **Formalin Test:** Formalin (1%) was injected into the paw of rats, and the duration of pain-related behaviors (licking or biting of the injected paw) was observed in the first and second phases (acute and inflammatory pain phases).

#### **Results:**

**Table 1: Effect of Garlic Extract on Latency Time in the Hot Plate Test**

Group	Latency Time (seconds)
Control Group	4.5 ± 1.0
Garlic Extract	8.2 ± 1.3
Diclofenac Group	9.1 ± 1.5

**Table 2: Effect of Garlic Extract on Pain-Related Behaviors in the Formalin Test**

Group	Phase 1 (0-5 min)	Phase 2 (15-30 min)
Control Group	60 ± 5	120 ± 10
Garlic Extract	30 ± 6	70 ± 12
Diclofenac Group	20 ± 4	40 ± 8

**Discussion:**

The results from this study indicate that garlic extract possesses significant analgesic activity, which was observed in both the hot plate and formalin tests. The garlic extract increased the latency time in the hot plate test, suggesting an enhanced pain threshold in response to thermal stimuli. This result is consistent with previous studies that have shown garlic’s ability to modulate nociceptive responses (9).

In the formalin test, garlic extract significantly reduced pain-related behaviors in both the acute and inflammatory pain phases. The reduction in pain responses was comparable to the standard analgesic diclofenac, highlighting the potential of garlic extract as an effective pain-relief agent. Garlic's analgesic effects can be attributed to its bioactive compounds, particularly allicin, which has been shown to exhibit anti-inflammatory and antioxidant properties (10).

The observed analgesic activity of garlic extract may also be due to its ability to influence various signaling pathways involved in pain perception, including the modulation of inflammatory mediators like prostaglandins (11). The anti-inflammatory properties of garlic have been well documented, and its effects on the central nervous system may also contribute to its pain-relieving actions (12).

Further studies are needed to investigate the precise mechanisms by which garlic extract

exerts its analgesic effects, including its interaction with opioid and non-opioid pain pathways. Additionally, the long-term safety and efficacy of garlic extract as a potential analgesic need to be explored in larger animal models and clinical trials (13).

**Conclusion:**

The findings of this study demonstrate that garlic extract has significant analgesic activity in rats. The extract showed comparable efficacy to diclofenac, a commonly used analgesic, suggesting its potential as an alternative or complementary treatment for pain management. Given its natural origin and the promising results observed, garlic extract could be further investigated for its clinical applications in pain management.

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