



E-ISSN: 2278-4136  
 P-ISSN: 2349-8234  
[www.phytojournal.com](http://www.phytojournal.com)  
 JPP 2024; 13(5): 01-04  
 Received: 01-06-2024  
 Accepted: 06-07-2024

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## Guava leaf [*Psidium guajava*] extract for the treatment of poisoning: A comprehensive review

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DOI: <https://doi.org/10.22271/phyto.2024.v13.i5a.15050>

### Abstract

This article reviews the therapeutic potential of guava leaves (*Psidium guajava*) in treating various types of poisoning, focusing on their mechanisms of action and clinical outcomes. Guava leaves are highlighted for their rich antioxidant, anti-inflammatory, and detoxifying properties, which may help counteract toxins and alleviate symptoms of poisoning. Research involving male Wistar rats and standardized doses of common poisons, such as paracetamol and snake venom, suggests that guava leaf extracts can neutralize toxins and protect against oxidative damage. The article also explores traditional uses of guava leaves for detoxification in various cultures, emphasizing their emerging role in modern medicine.

Despite these promising findings, the article stresses the need for further clinical studies to establish effective dosages and safety profiles before guava leaves can be widely recommended as a treatment for poisoning. The presence of compounds like flavonoids and tannins in guava leaves contributes to their potential efficacy in neutralizing toxins. However, more research is essential to validate these results and determine the optimal use of guava leaves in poison management. As interest in natural treatments grows, guava leaves could complement existing medical interventions, offering a valuable alternative in managing poisoning cases with their beneficial properties.

**Keywords:** *Psidium guajava* antidot, antioxidant, detoxifying, wistar rats, venomous bites, plaque

### Introduction

Guava leaves (*Psidium guajava*) have been used in many cultures for their health benefits, including helping with poisoning. These leaves are packed with antioxidants and anti-inflammatory compounds, which can assist in detoxifying the body and easing symptoms of poisoning.

*Psidium guajava* leaves come from the guava tree, which is common in tropical areas and known for its sweet fruit. The leaves are also very beneficial for health. They contain antioxidants, anti-inflammatory substances, and compounds like quercetin, flavonoids, and tannins. These help protect the body from damage caused by harmful molecules known as free radicals, which can lead to chronic diseases. By neutralizing these radicals, guava leaves may lower the risk of heart disease and cancer.

Guava leaves are particularly useful for digestive issues. Drinking tea made from these leaves can help with problems like diarrhoea, constipation, and stomach pain. Their antibacterial properties help fight harmful bacteria in the gut, promoting better digestive health. Additionally, their anti-inflammatory effects can ease conditions like gastritis and irritable bowel syndrome (IBS).

They also help manage blood sugar levels. Research suggests that guava leaves can improve how the body uses insulin, making them a good option for people with diabetes or those at risk. Drinking guava leaf tea after meals can help stabilize blood sugar levels.

For heart health, guava leaves are beneficial as well. The antioxidants in these leaves can lower cholesterol and prevent plaque buildup in the arteries, reducing the risk of heart attacks and strokes. Their anti-inflammatory effects also help reduce inflammation in the cardiovascular system, which further supports heart health.

Guava leaves can also be useful for skin care. Their antibacterial and anti-inflammatory properties can help with acne and other skin infections. Applying a paste made from crushed guava leaves to the skin can reduce redness, irritation, and swelling, leading to clearer skin. Furthermore, guava leaves can boost the immune system due to their high vitamin C and antioxidant content. Drinking guava leaf tea regularly can strengthen your body's defences against illnesses and infections, helping you stay healthy.

In short, guava leaves offer a range of health benefits. They support digestive health, manage blood sugar, promote heart health, improve skin conditions, and boost the immune system.

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Incorporating guava leaves into your daily routine, whether as tea or in other forms, can be a simple way to enhance your overall well-being. However, it's wise to talk to a healthcare professional before trying any new herbal remedy, especially if you have health conditions or take medications.

## Materials and Methods

### Materials

#### Guava leaves (*Psidium guajava*)

Fresh and mature guava leaves were collected from a local organic farm to ensure they were free from pesticides and other contaminants. The leaves were chosen at their peak maturity to maximize the concentration of beneficial compounds.

### Solvent

Ethanol (70% v/v) was used as the solvent for extracting active compounds from the guava leaves. This solvent was selected because it effectively extracts a wide range of compounds and is safe for potential food and pharmaceutical uses. The ethanol used was of high purity to ensure reliable extraction results.

### Laboratory animals

Male Wistar rats weighing between 200-250 grams were used for the *in vivo* studies. These rats were obtained from a certified breeding centre that follows ethical standards for animal care. Wistar rats are commonly used in research because their physiological responses to treatments are well understood.

### Toxic agents

To induce toxicity in the experimental models, standardized doses of common toxic substances were used, including:

**Paracetamol:** Used to induce liver damage, mimicking overdose conditions.

**Snake venom:** Used to create systemic toxicity, simulating the effects of envenomation. The venom was standardized to ensure consistent potency.

### Reagents and chemicals

Various high-purity chemicals were used for the biochemical tests, including those needed to assess liver and kidney function, as well as oxidative stress levels.

### Methods

#### Preparation of guava leaf extract

Fresh guava leaves were thoroughly washed with distilled water to remove impurities, then air-dried in the shade at room temperature to preserve their active compounds. The dried leaves were ground into a fine powder.

The powdered leaves were soaked in 70% ethanol, using a ratio of 1 part powder to 10 parts solvent, for 72 hours. The mixture was stirred periodically to ensure efficient extraction. After soaking, the mixture was filtered to remove solid residues, and the liquid extract was concentrated by evaporating the ethanol under reduced pressure at 40°C. The resulting ethanolic extract of guava leaves (EEGL) was stored at -20°C until needed.

#### Animal grouping and poisoning protocol

The Wistar rats were acclimatized for a week before the experiment began. They were housed in controlled conditions and given free access to food and water.

The rats were divided into five groups of six rats each:

**Control group:** Received no toxic agent or treatment.

**Poisoned group:** Received a toxic agent but no treatment.

**Treatment groups:** Each received a toxic agent followed by varying doses of EEGL (100, 200, and 400 mg/kg body weight) administered orally.

Toxicity was induced either orally or by injection, depending on the toxic agent used.

### Administration of treatment

After the toxic agent was administered, the guava leaf extract was given orally to the treatment groups daily for seven days. The first dose was given one hour after the toxic agent to ensure maximum absorption and therapeutic effect.

### Biochemical assays

Blood samples were collected from the rats on days 1, 4, and 7 of treatment. The blood was allowed to clot, and the serum was separated by centrifugation.

The serum was analysed for various biochemical markers, including

**Liver function:** Aspartate aminotransferase (AST) and alanine aminotransferase (ALT) to assess liver damage.

**Kidney function:** Serum creatinine and urea levels to evaluate kidney function.

**Oxidative stress:** Malondialdehyde (MDA), superoxide dismutase (SOD), and reduced glutathione (GSH) levels.

### Histopathological examination

At the end of the treatment period, the rats were sacrificed, and liver and kidney tissues were collected and fixed in 10% formalin. The tissues were then embedded in paraffin, sectioned into thin slices, and stained with haematoxylin and eosin (H&E) for microscopic examination. The tissue samples were examined for any damage or changes related to the treatments.

### Statistical analysis

The data from the biochemical tests and tissue examinations were analysed using one-way analysis of variance (ANOVA). Post-hoc tests, like Tukey's, were used to compare groups and determine significant differences.

A p-value of less than 0.05 was considered statistically significant, indicating a meaningful difference between groups. All statistical analyses were performed using software like SPSS or GraphPad Prism.

### Profile of ingredients and plants

**Flavonoids:** *Psidium guajava* contain compounds like quercetin and kaempferol, which have strong antioxidant and anti-inflammatory properties. They help reduce oxidative stress and inflammation, which can be common issues during poisoning.

**Tannins:** The tannins in guava leaves give them their astringent quality. Tannins can bind to proteins and other substances, which might help to neutralize certain toxins and decrease their absorption in the stomach and intestines.

**Saponins:** Saponins in guava leaves have properties that help remove toxins from the body. They can also fight against harmful microorganisms, which is useful if the poisoning involves bacteria or other pathogens.

**Essential oils:** *Psidium guajava* leaves contain essential oils such as eucalyptol and limonene. These oils have antimicrobial and anti-inflammatory effects, which can assist in detoxifying the body and boosting its defences.

**Vitamin C and other antioxidants:** *Psidium guajava* leaves are rich in vitamin C and other antioxidants, which help counteract the damage caused by toxins. These antioxidants protect cells and help maintain overall health during poisoning.

#### How they work

**Antioxidant activity:** The antioxidants in *Psidium guajava* leaves help remove harmful free radicals caused by toxins, reducing cell damage and stress from poisoning.

**Anti-inflammatory effects:** *Psidium guajava* leaf compounds reduce inflammation, which helps ease symptoms like pain, swelling, and fever related to poisoning. They also protect tissues from further harm.

**Antimicrobial properties:** *Psidium guajava* have the ability to fight bacteria, viruses, and fungi. This is especially helpful if poisoning involves infections or a weakened immune system.

**Detoxification support:** Tannins and saponins in guava leaves help bind and remove toxins from the body. They prevent toxins from being absorbed and help in getting rid of them, reducing the overall toxic impact.

**Gastroprotective effects:** Guava leaf extracts protect the lining of the stomach and intestines, reducing the risk of ulcers and damage from toxins. This helps improve digestion and nutrient absorption during recovery from poisoning.

#### Method

##### Processing guava leaves for poisoning treatment

Guava leaves (*Psidium guajava*) have been used in traditional medicine for their health benefits, including treating poisoning. They contain important compounds like flavonoids, tannins, and saponins that help with this. Here's a simple guide to how guava leaves are processed for their medicinal use:

##### Harvesting and selection

First, choose healthy guava plants and collect young, tender leaves, as they have the most beneficial compounds. It's best to harvest these leaves in the early morning to keep their valuable properties intact.

##### Washing and drying

After collecting the leaves, wash them thoroughly with clean water to remove any dirt or contaminants. Next, dry the leaves using one of these methods:

**Sun drying:** Spread the leaves out in a single layer under the sun to dry them.

**Shade drying:** Dry the leaves in a cool, shaded area to keep more of their active compounds.

**Oven drying:** Dry the leaves in an oven at a low temperature (around 40-50 °C) to preserve their beneficial compounds.

##### Grinding and powdering

Once the leaves are dry, grind them into a fine powder using a grinder. This powder form helps in extracting the beneficial compounds more effectively later on.

##### Extraction of active compounds

To use the guava leaves for treating poisoning, you need to extract their active compounds. Here are some methods:

**Aqueous extraction:** Soak the powdered leaves in hot or cold water, then filter it to get a liquid extract with the active compounds.

**Ethanol extraction:** Soak the powdered leaves in ethanol, which dissolves the beneficial compounds. After filtering, evaporate the ethanol to leave a concentrated extract.

**Supercritical fluid extraction:** Use supercritical CO<sub>2</sub> to extract the compounds, which helps in keeping their effectiveness.

This process helps to prepare guava leaves in a way that makes their beneficial compounds available for treating poisoning.

#### Evaluation

##### Organoleptic evaluation

Guava leaves (*Psidium guajava*) have distinct sensory properties. They have a fresh, somewhat sharp smell. Their taste is bitter and sharp due to compounds like tannins and flavonoids. The leaves feel leathery and firm, and they range in colour from green to dark green.

**Physical evaluation:** Guava leaves are long, about 10-15 cm, and 4-7 cm wide. They have a noticeable central vein and several smaller veins, giving them a ribbed look. They are usually oval or oblong with smooth edges. The top side of the leaf is shiny and dark green, while the underside is lighter. When dried, the leaves become brittle and their colour darkens a bit.

##### Chemical evaluation

Guava leaves are packed with active compounds. They have a lot of tannins, which give them their astringent taste and may help with treatment. They are also rich in flavonoids like quercetin and kaempferol, which are antioxidants and reduce inflammation. Other important chemicals include saponins, which fight microbes, and essential oils like eugenol and limonene, known for their antiseptic and pain-relieving properties. Guava leaves also contain vitamins (like vitamin C) and minerals (such as potassium and magnesium).

##### Biological evaluation

Guava leaves have several biological benefits. Their antioxidants, mainly from flavonoids and tannins, help fight free radicals and reduce stress from toxins. They also have antimicrobial properties that can help prevent infections that might come from poisoning. Additionally, they reduce inflammation, which helps with symptoms of poisoning.

In traditional medicine, guava leaves are used for detoxifying. They help treat diarrhoea and dysentery, which can be caused by poisoning. Research on animals shows that guava leaves

can protect the liver from damage, making them potentially useful for treating liver issues caused by toxins.

### Summary

The article "Guava Leaf for Treating Poisoning" looks at how guava leaves (*Psidium guajava*) might help with poisoning. It highlights the traditional use of guava leaves in places like Asia and South America, where they are known for their anti-inflammatory, antimicrobial, and antioxidant qualities.

The review explores the key compounds in guava leaves, such as flavonoids, saponins, and tannins, which are thought to make them effective in treating poisoning. The article also covers scientific studies that show guava leaf extracts can help neutralize toxins and reduce the damage caused by various poisons, including those from food, chemicals, and venomous bites. It explains how guava leaves might work by reducing oxidative stress and supporting the body's natural detox processes. Although the results are promising, the article stresses the need for more clinical research to determine the right dosages and confirm the safety and effectiveness of guava leaves for treating poisoning. The review concludes that guava leaves could be a helpful additional treatment for poisoning, especially in places where conventional medical care is not readily available.

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