

## PHYTOCHEMICAL SCREENING AND IN VITRO ANTHELMINTIC ACTIVITY OF ETHANOLIC LEAF EXTRACT OF *PSIDIUM GUAJAVA*

Gokul Bal B. V.<sup>1\*</sup>, Manivannan R.<sup>1\*</sup>, Kaviya R.<sup>1</sup>, Lalitha P.<sup>1</sup>, Leemarose A.<sup>1</sup>,  
Sridhar A.<sup>1</sup>

Department of Pharmacology, Excel College of Pharmacy, Namakkal, Tamil Nadu, India.

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### \*Corresponding Author

**Gokul Bal B. V.**

Department of Pharmacology, Excel  
College of Pharmacy, Namakkal,  
Tamil Nadu, India.



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### ABSTRACT

Helminth infections remain a significant public health problem, particularly in developing countries where poor sanitation and limited access to healthcare contribute to widespread transmission. Medicinal plants have long been used in traditional medicine as alternative therapeutic agents against parasitic infections. *Psidium guajava* (Guava) is a medicinal plant known for its diverse pharmacological properties due to the presence of bioactive phytochemicals such as flavonoids, tannins, alkaloids, and saponins. The present study aimed to evaluate the phytochemical constituents and in-vitro anthelmintic activity of ethanolic leaf extract of *Psidium guajava*. The leaves were collected, dried, powdered, and extracted using ethanol by Soxhlet extraction method. Preliminary phytochemical screening was carried out to identify the presence of secondary metabolites. The

anthelmintic activity was evaluated using earthworms (*Pheretima posthuma*) as the experimental model. Albendazole was used as the standard drug, and the extract was tested at different concentrations. The results revealed the presence of important phytochemicals including flavonoids, tannins, alkaloids, and glycosides. The ethanolic extract exhibited significant anthelmintic activity in a dose-dependent manner by causing paralysis and death of worms comparable to the standard drug. These findings suggest that *Psidium guajava* leaf extract possesses promising anthelmintic properties and may serve as a potential source for the development of natural antiparasitic agents.

**KEYWORDS:** *Psidium guajava*, Anthelmintic activity, Phytochemical screening, Ethanolic extract, Helminths.

## INTRODUCTION

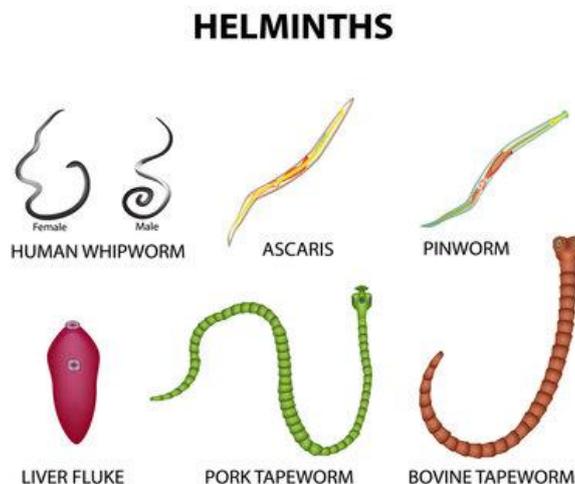
Helminthiasis refers to infections caused by parasitic worms such as nematodes, cestodes, and trematodes. These infections affect millions of people worldwide and are particularly prevalent in tropical and subtropical regions. According to the World Health Organization (WHO), approximately two billion people are infected with helminths globally, making it a major public health concern.

Anthelmintic drugs are used to treat parasitic worm infections; however, the emergence of drug resistance and adverse effects associated with synthetic drugs has increased the need for alternative therapies. Medicinal plants are considered promising sources for new anthelmintic agents because of their availability, safety, and traditional usage.

*Psidium guajava* L., commonly known as guava, belongs to the family Myrtaceae. The plant is widely distributed in tropical and subtropical regions and has been used in traditional medicine for the treatment of various diseases such as diarrhea, inflammation, microbial infections, and parasitic infestations. Guava leaves are rich in bioactive compounds including flavonoids, tannins, saponins, and phenolic compounds which contribute to their pharmacological activities.

Several studies have reported the antimicrobial, antioxidant, anti-inflammatory, and antidiarrheal properties of *Psidium guajava*. The presence of tannins and polyphenolic compounds suggests that the plant may possess anthelmintic activity by interfering with the energy metabolism of parasites or damaging their cuticle.

Therefore, the present study was undertaken to evaluate the phytochemical constituents and in-vitro anthelmintic activity of ethanolic leaf extract of *Psidium guajava* using earthworms as the experimental model.



**Figure 1: Types of Helminths (Parasitic Worms)**

## **MATERIALS AND METHODS**

### **Plant Material Collection**

Fresh leaves of *Psidium guajava* were collected and authenticated. The leaves were washed, shade-dried, and powdered using a mechanical grinder.

### **Preparation of Extract**

The dried leaf powder was subjected to Soxhlet extraction using ethanol as the solvent. The extract obtained was concentrated using a rotary evaporator and stored in airtight containers for further analysis.

### **Phytochemical Screening**

Preliminary phytochemical tests were carried out to detect the presence of various secondary metabolites such as.

- Alkaloids
- Flavonoids
- Tannins
- Glycosides
- Saponins
- Phenolic compounds

Standard qualitative tests were performed for identification.

### Experimental Worms

Earthworms (*Pheretima posthuma*) were used as the experimental model due to their anatomical and physiological similarity to intestinal roundworms.

### Anthelmintic Activity

The anthelmintic activity of the extract was evaluated by observing the time required for paralysis and death of worms.

### Test Groups

- Control group (distilled water)
- Standard drug: Albendazole
- Ethanolic extract of *Psidium guajava* at different concentrations
  - 25 mg/ml
  - 50 mg/ml
  - 100 mg/ml

The worms were placed in Petri dishes containing the test solutions and observed for paralysis and death.

## RESULTS

### Phytochemical Screening

Qualitative phytochemical analysis of the ethanolic leaf extract of *Psidium guajava* revealed the presence of several biologically active secondary metabolites. The extract tested positive for terpenoids, carbohydrates, alkaloids, quinones, phenolic compounds, saponins, steroids, tannins, glycosides, flavonoids, and amino acids, while fixed oils, fats, and anthraquinones were absent.

The presence of these phytoconstituents suggests that the plant possesses significant pharmacological potential, as many of these compounds are known to exhibit antimicrobial, antioxidant, and anthelmintic activities.

**Table 1: Phytochemical Analysis of Ethanol leaf extract of *Psidium guajava*.**

S.No	Phytoconstituents	Ethanolic extract
1	Terpenoids	+
2	Carbohydrates	+
3	Alkaloids	+
4	Quinones	+
5	Phenolic Compounds	+

6	Saponins	+
7	Steroids	+
8	Tannins	+
9	Fixed oils and fats	-
10	Glycosides	+
11	Flavonoids	+
12	Amino acids	+
13	Anthraquinones	-
	(+)Present	

### Anthelmintic Activity

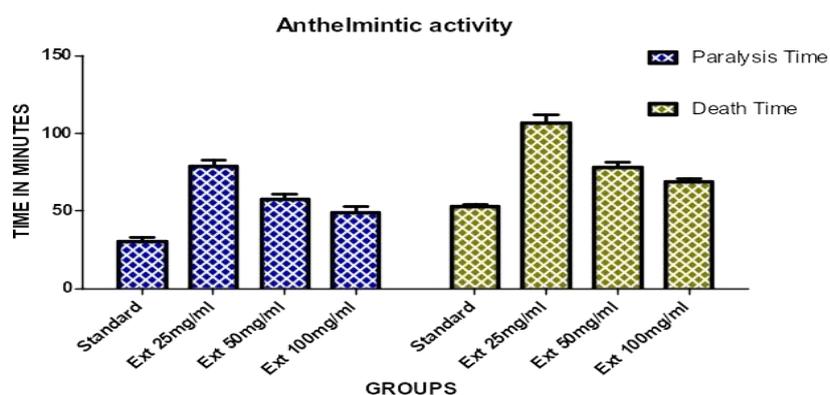
The ethanolic extract of *Psidium guajava* leaves was evaluated for in-vitro anthelmintic activity against *Pheretima posthuma* at concentrations of 25, 50, and 100 mg/ml. Albendazole (20 mg/ml) served as the standard drug, while 1% CMC solution was used as control.

The results showed that the plant extract exhibited dose-dependent anthelmintic activity. As the concentration of the extract increased, the time required for paralysis and death of worms decreased, indicating stronger activity at higher concentrations.

**Table 2: Anthelmintic activity of methanol extract of *Psidium guajava*.**

Extract	Concentration (mg/ml)	<i>Pheretima posthuma</i>	
		Paralysis time (minutes)	Death time (minutes)
Control (1% CMC)	-	-	-
Standard (Albendazole)	20 mg/ml	30.50 ± 2.50	53.00 ± 1.52
Ethanolic Extract of <i>Psidium guajava</i>	25 mg/ml	79.16 ± 3.69**	106.66 ± 5.14 **
	50 mg/ml	57.66 ± 3.48**	78.33 ± 2.96**
	100 mg/ml	49.00 ± 3.73**	69.00 ± 1.93**

Among the tested concentrations, 100 mg/ml showed the strongest activity, producing paralysis and death of worms in significantly shorter time compared with lower doses.



**Figure 2: Comparative Anthelmintic Activity of Plant Extract and Standard Drug.**

## DISCUSSION

The present study evaluated the *in vitro* anthelmintic activity of the ethanolic extract of *Psidium guajava* leaves against *Pheretima posthuma* using paralysis time and death time as pharmacological parameters. The results demonstrated that the extract exhibits significant anthelmintic activity in a concentration-dependent manner when compared with the standard drug albendazole.

Albendazole (20 mg/ml) produced rapid paralysis ( $30.50 \pm 2.50$  min) and death ( $53.00 \pm 1.52$  min), confirming its strong anthelmintic efficacy. In comparison, the *Psidium guajava* extract showed moderate but significant activity, with decreasing paralysis and death times as the concentration increased from 25 mg/ml to 100 mg/ml. The lowest concentration (25 mg/ml) produced the longest paralysis ( $79.16 \pm 3.69$  min) and death time ( $106.66 \pm 5.14$  min), while the highest concentration (100 mg/ml) produced faster effects with paralysis at  $49.00 \pm 3.73$  min and death at  $69.00 \pm 1.93$  min.

The anthelmintic activity of *Psidium guajava* may be attributed to the presence of phytochemicals such as flavonoids, tannins, saponins, alkaloids, terpenoids, and phenolic compounds. Tannins may bind to proteins on the parasite cuticle, leading to structural damage, while flavonoids and phenolics interfere with parasite metabolism. Saponins may disrupt membrane integrity, causing paralysis and death of the worms.

Overall, the findings support the traditional use of *Psidium guajava* in treating parasitic infections and suggest that its ethanolic extract possesses appreciable anthelmintic activity, although its potency is lower than that of albendazole.

## CONCLUSION

The present study demonstrated that the ethanolic leaf extract of *Psidium guajava* contains several phytochemical constituents and exhibits significant *in-vitro* anthelmintic activity against earthworms. The activity was found to be concentration-dependent and comparable to the standard drug albendazole.

These results suggest that *Psidium guajava* leaves may serve as a potential source of natural anthelmintic agents. Further studies are required to isolate the active compounds and evaluate their mechanism of action and clinical efficacy.

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