

ANTIBACTERIAL EFFECT OF AQUEOUS EXTRACT OF PSIDIUM GUAJAVA LEAVES – A PRELIMINARY STUDY

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Abstract:

The increasing prevalence of antibiotic-resistant bacterial strains has encouraged the exploration of medicinal plants as alternative antimicrobial agents. *Psidium guajava* (L.) (PG) belongs to the Myrtaceae family and it is an important fruit in tropical areas like India. Several pharmacological effects of extracts from guava leaves (GLs), including anticancer, antidiabetic, antioxidant, antidiarrheal, lipid-lowering, and hepatoprotective actions, have been documented. The present study investigated the antibacterial activity of *Psidium guajava* leaves by disc diffusion method against *Staphylococcus aureus*, *enterobacter* and *Pseudomonas aeruginosa*. Results revealed that PG leaf extract possesses significant anti-microbial property with increased zone of inhibition at a concentration of 100µg/ml. The study concluded that PG leaves could act as a natural antibacterial product in the field of medicine. The findings suggest that guava leaf aqueous extract possesses promising antibacterial properties and may serve as a potential source of natural antimicrobial compounds. Further studies are required to isolate the active constituents and evaluate their pharmacological applications.

Keywords: *Psidium guajava*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa*

INTRODUCTION

Folk medicine has been using natural products for a number of years. In the past ten years, herbal remedies have become a widely used therapeutic approach worldwide for the prevention and treatment of a wide range of illnesses. Herbal remedies are safer to use because they avoid many of the negative effects of contemporary medications. An individual's functional and aesthetic well-

being is influenced by their oral health. (1) Many herbal formulations with herbs are currently in use for the preparation of antibacterial medications.

Medicinal plants have been widely utilized for the prevention and treatment of various human diseases since ancient civilizations. In recent years, there has been increasing interest in plant-derived medicines due to the rapid rise of antibiotic-resistant microorganisms and the limitations associated with synthetic drugs. The development of multidrug-resistant bacterial strains has become a major global health concern, prompting scientists to investigate natural sources for effective antimicrobial compounds. Among the numerous medicinal plants studied, *Psidium guajava* L. (guava) has gained significant attention because of its diverse medicinal, therapeutic, and pharmacological activities (1).

One such herbal formulation which we made in this study was using *Psidium guajava* leaves. *Psidium guajava* (L.), a member of the Myrtaceae family, is a significant fruit in tropical regions like South America, Bangladesh, Pakistan, Indonesia, and India. Several phytochemicals found in guava leaves, including quercetin, avicularin, apigenin, guajaverin, kaempferol, hyperin, myricetin, gallic acid, catechin, epicatechin, chlorogenic acid, epigallocatechin gallate, and caffeic acid, have been researched for their potential health benefits. Studies on the biological effects of guava leaf extracts (GLs) have focused on its hepatoprotective, anticancer, antidiabetic, antioxidant, antidiarrheal, anti-microbial, and lipid-lowering properties (3)

The present invention relates to a formulation of herbal tooth powder using leaves of *Psidium Guavaja*, alum and common salt. This herbal tooth powder has a natural aroma, pleasant odour and possesses efficient teeth whitening properties and antibacterial properties. *Psidium Guavaja* leaves, ALUM possesses antibacterial properties, astringent properties and teeth whitening effects. More particularly, the invention provides a formulation useful for the stained teeth and prevents against dental plaque and caries. Due to its astringent property, it is also useful against bleeding and swollen gums.

MATERIALS AND METHODS

Plant collection: Fresh leaves of *Psidium guajava* were collected was washed and shade dried. It was finely powdered in an electrical blender.

Preparation of guava leaf extract: In a sterile Erlenmeyer flask (150 mL), about 20g of guava leaf powder was made to boil for 30 minutes at 90 °C with 100 mL of double-distilled water. The mixture was centrifuged at 4000 rpm for 10 min (4). The supernatant was removed and stored at 4 °C for further studies.

Determination of antibacterial activity: Guava leaf extract was assessed for antibacterial activity against *Staphylococcus aureus*, *Enterobacter* and *pseudomonas aeriginosa* by disc diffusion method. Each strain was kept alive for 24 hours at 37 °C on nutrient agar slant. The inoculum was evenly distributed across the nutrient agar plate's surface and let to dry. The inoculated agar plate was placed on the sterile disc (6 mm), which was then loaded with 60 L of guava leaf extract and incubated at 37 °C. After 48 hours of incubation, the zone of inhibition produced by the antagonistic effect of guava aqueous leaf extracts was recorded. The double distilled water used for extraction and Linezolid, Vancomycin and piperacillin/tazobactam (50 mg/mL) was considered as positive controls. The diameter of inhibitory zone was measured both vertically and horizontally and its average (in mm) was considered (5)

Determination of Zone of Inhibition

The antibacterial activity was determined by measuring the diameter of the clear zone formed around each well. The experiment was conducted in triplicate, and the mean values were recorded.

Statistical analysis: All the experiments were conducted on three replicates and data was expressed as mean \pm standard deviation. Data obtained from the study were analyzed using standard statistical methods.

RESULTS

Table- 1 Antimicrobial property of the *psidium guajava* leaves

S.no	Organism	Zone of inhibition	Positive control
1	Staphylococcus aureus	26 mm + 0.2	Linezolid 30 mm
2	Enterobacter	24 mm + 0.1	Vancomycin 26 mm
3	Pseudomonas aeriginosa	24 mm + 0.3	Piperacillin/tazobactam 30 mm

Experiments were done in triplicate.

Figure 1- Antibacterial activity *psidium guajava* leaves



STAPHYLOCOCCUS AUREUS STAPHYLOCOCCUS ENTEROCOCCUS
PSEUDOMONAS AERIGINOSA

Antibacterial activity of the guava leaf extract evaluated against *Staphylococcus aureus*, *Enterobacter* and *pseudomonas aeriginosa*. Besides, the zone of inhibition of *Staphylococcus* mutants, *Enterobacter* and *pseudomonas* were nearing the same and acted well against the organism and was nearing the values of positive control (Table1, Fig 1).

DISCUSSION

The aqueous extract of guava leaves was screened for antibacterial activity and the results revealed that PG leaf extract possesses significant anti-microbial property with increased zone of inhibition at a concentration of 100µg/ml. This effect may be attributed to the presence of phytochemicals such as glycosides, flavonoids, saponins, polyphenols, terpenoids and tannins present in the extract (Table 1) Previous reports supported the findings of the present study. (4) reported presence of glycosides, flavonoids, saponins, terpenoids, phenol and carbohydrates in the aqueous extract of guava leaves. Presence of these phytochemicals were found to possess various physiological activities, like antioxidant and antibacterial properties (6)

GCMS analysis of guava leaf extract indicated the presence of quercetin, gallic acid, esculin, 3-sinapoylquinic acid, ellagic acid, gallic acid and citric acid that have several medicinal properties. Presence of Ellagic acid acts to have a good anti-cancer activity and a better antimicrobial activity against several viral and bacterial infections (7)

The present study worked on antibacterial activity against *Staphylococcus* strains that act towards foodborne diseases. *Psidium guajava* leaf powder possess significant anti-bacterial action.

CONCLUSION

The present study investigated the antibacterial activity of aqueous extract of *Psidium guajava* leaves against *Staphylococcus aureus*, *Enterobacter* and *Pseudomonas aeruginosa*. *Psidium*

Guavaja leaf extract possesses significant anti-microbial property with increased zone of inhibition at a concentration and demonstrated a good ability with antibacterial action.

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