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ANTIBACTERIAL ACTIVITY OF GUAVA LEAVES EXTRACTS AGAINST *S. MUTANS*

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Abstract: The interest in medicinal plants is now directed to the production of therapeutic formula with low toxicity and cost. Guava Leaves was washed under running tap water, shade dried and then homogenized to fine powder and successive solvent extraction. The test pathogen previously isolated and identified *S. mutans* is used for the study of antibacterial activity against extract of Guava Leaves. The ethanol extracts of Guava leaves were shown better results against *S. mutans*. The *Psidium guajava* Linn. are used for the development of various industrial and pharmaceutical products.

Keywords: *Psidium guajava* Linn, *S. mutans* and ethanol extracts.

INTRODUCTION

About 80% of individuals from developed countries use traditional medicine, which has compounds derived from medicinal plants. Therefore, such plants should be investigated to better understand their properties, safety and efficiency[1]. Medicinal plants are important with respect to new drug and pharmacological research development. They are widely used and accepted as home remedies and raw materials for the pharmaceutical industry[2]. The presence of *S. mutans* and *S. Sobrinus* is most prevalent in the initial stages of caries. The *L. casei* is found during the development of cavities[3]. *S. oralis* and *S. salivarius* are also present in the biofilm. To explain multifactorial nature of caries, not only the biological factors should be included (biofilm, saliva and diet), but the modulating factors (income, education, behavioral factors, among others), which indirectly influence, to a greater or lesser extent, the probability of an individual developing this disease, must also be taken into consideration. Diseases, among them caries, are related to the lack of basic sanitation in developing countries, in addition to malnutrition and the difficulty of access to medication. Within this context, phytotherapy is widely practiced, and the popular use of traditionally established medicinal plants has been taken as a guide for different studies[4, 5].

The acid producing *S. mutans* inhabiting the mouth causes damage by dissolving tooth structures in the presence of fermentable carbohydrates such as sucrose, fructose, and glucose[6]. The food debris, acid, bacteria, and saliva combine in the mouth to form a sticky substance called "plaque" that adheres to the teeth. If plaque is not removed thoroughly and routinely, tooth decay will not only begin but flourish[7]. It has been well documented that medicinal plants confer antimicrobial activity towards oral bacteria[8, 9]. The literature survey of the folklore medicine reveals the use of *Psidium guajava* leaves to maintain oral hygiene[10].

Several studies have been conducted to find new plants with anti-microbial activity[11]. *Psidium species* belongs to the Myrtaceae family and it is native to tropical America. Traditionally, plants of the *Psidium spp. Species* are used to treat scurvy in Asia and Africa; cough and lung dysfunctions in Bolivia and Egypt; as an anti-inflammatory and hemostatic agent in China, and as an anti-diarrhea compound in Mexico[12, 13]. The plants with therapeutic properties used in traditional health care are an important source of new biologically active compounds[12]. The interest in medicinal plants is now directed to the production of therapeutic formulae with low toxicity and cost. This is significantly important for countries with poor financial resources, but rich in biodiversity[14, 5]. The objective of present study is antibacterial property of the plant leaves extracts is performed against *S. mutans*.

MATERIALS AND METHODS

Guava Leaves was washed under running tap water, shade dried and then homogenized to fine powder and stored in airtight bottles. Different solvents like Petroleum ether, ethanol, Chloroform and water were chosen for solvent extraction and the extracts of Guava Leaves were concentrated under reduced pressure using rotary evaporator[15]. The test pathogen previously isolated and identified *S. mutans* is used for the study of antibacterial activity against Guava Leaves. Antibacterial activity is studied by using the disc diffusion method[16]. The Whatman filter paper No.1 6 mm discs were put in a clean glass bottle and sterilized at 121°C for 15 min in an autoclave. The antibacterial activity of each extract expressed in terms of diameter of zone of inhibition (in mm) produced by respective extract.

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RESULTS AND DISCUSSION

The antibacterial activity of the Guava leaves extract was performed against *S. mutans*. The antibacterial activity of ethanol extract of guava leaves was shown optimum results against *S. mutans* with zone of inhibition 18 mm. The chloroform and benzene extract was not shown activity. While the acetone, methanol and petroleum ether extracts of guava leaves were shown moderate activity against *S. mutans* with zone of inhibition 12 mm, 11 mm and 12 mm respectively which was shown in table 1.

Table 1: Antibacterial activity of crude leaves extract of guava against *S. mutans*.

Sr. No.	Crude Extract in solvents / Antibiotics	Symbol	Zone of Inhibition mm
1	Acetone	Ac	12
2	Methanol	Me	11
3	Benzene	Ben	00
4	Petroleum Ether	PE	12
5	Chloroform	Chl	00
6	Ethanol	Et	18
7	Erythromycin	E	28
8	Co-Trimoxazole	Co	20
9	Ciprofloxacin	Cf	22
10	Tetracycline	T	00
11	Tobramycin	Tb	21
12	Ampicilin	A	11

The results of antibacterial activity was suggest that the presence of bioactive compound in the extract of medicinal plants shown the activity against pathogenic bacteria. The ethanol extract of guava leaves was shown maximum activity against *S. mutans* which was shown in fig. 1. While remaining extract were shown the moderate type antibacterial activity.

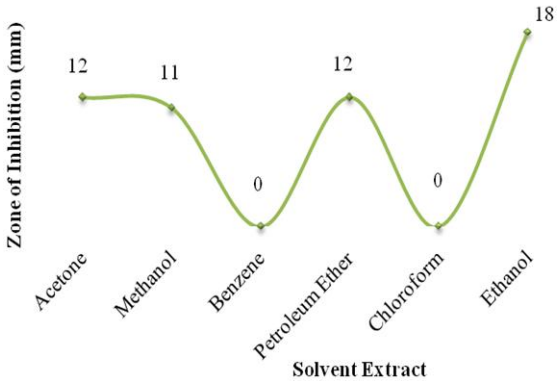

Figure 1: Antibacterial activity of guava leaves crude extracts against *S. mutans*

Buvaneswari *et al.*, 2011 found that the pathogenic strains (bacteria and fungi) are developing the resistance to current antibiotics, there is a need for the search of new antimicrobial agents mainly among plant extracts. *Psidium guajava* leaves have long been recognized for their antimicrobial activity. The phytochemical analysis was observed that the *Psidium guajava* contains alkaloids, flavonoids, phenols and tannin which may either individual or in combination are responsible for the antibacterial activity. From the observed results, it could be concluded that *Psidium guajava* leaves could serve as good source of antibacterial and antifungal agents[18].

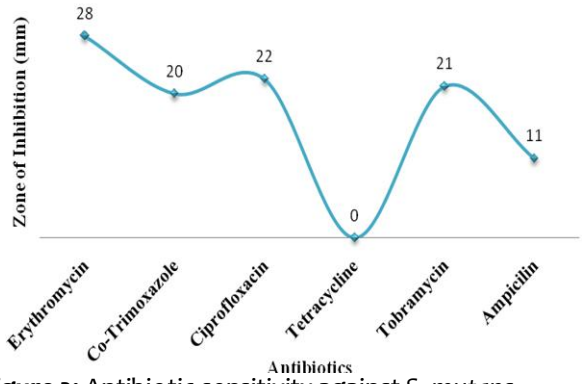

Figure 2: Antibiotic sensitivity against *S. mutans*

The antibiotic sensitivity test, the antibiotic erythromycin shown optimum activity against *S. mutans* (28mm). While *S. mutans* was resistance to antibotic tetracycline which was shown in fig. 2. Saraya et al., 2008 found that crude extract was also tested for antimicrobial susceptibility compared with standard antibiotic kanamycin. The largest clear zone of 12.50 ± 0.71mm in diameter was observed in crude 32× MIC comparing to 13mm in kanamycin. The negative control gave no clear zone[19].

CONCLUSION

The present study has helped in demonstrating the potential bioactive compound of natural plant extracts that are eco-friendly, economical and available in bulk to the farmers with easy preparation protocols. Medicinal properties of leaves of *Psidium guajava* Linn. is observed in various solvent extract against *S. mutans*. The ethanol extracts of Guava leaves were shown better results against *S. mutans*. The *Psidium guajava* Linn. may used for the development of various industrial and pharmaceutical products.

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