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ANTIBACTERIAL ACTIVITY OF *PSIDIUM GUAJAVA* LINN (GUAVA) LEAVES EXTRACTS ON BACTERIAL PATHOGENS

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Abstract: *Psidium guajava* Linn (Guava) commonly known for its food and nutritional values. The medicinal properties of leaves of *Psidium guajava* Linn are also well known in traditional system of medicine. Five grams of powder were used for crude solvent extraction in Chloroform, Ethanol, Petroleum Ether and Water. The solvents were evaporated to dryness and extracted compound was used for the antibacterial assay by disc diffusion method. The bacterial pathogens were used as *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella typhi.* The result was found that, the extracts of Guava leaves were inhibited the growth of *Salmonella typhi* to maximum extent than other pathogens. Finally, it was concluded that leaves extract of *Psidium guajava* Linn plant was shown effective and efficient result against bacterial pathogen used. *Psidium guajava* leaves could serve as good source of antibacterial agents.

Keywords: *Psidium guajava* Linn., Pathogens, Source

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. Plants of various origins have been exploited effectively over many generations for therapeutic purposes. The selection procedure was often haphazard to the extent that some valuable errors are caused (Sofowora, 1996). Thus, the discard or otherwise of such plant depends on its being beneficial or hazardous. In the local traditional settings, plant parts such as the roots or leaves are used without recourse to photochemical isolates (Balick and Cox, 1996). The argument is that the synergy of the combined substances enhances the efficacy and dilutes toxicity (Artuso, 1997). Modern pharmacy, however, prefers single ingredients on the grounds that dosage can be more easily quantified (Sofowora, 1996). 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 (Mule et al., 2013).

Guava leaves have several chemical constituents such as comarins, essential oils, flavonoids, triterpenes and ellagitannins which are known to have antimicrobial properties. The leaves of *Psidium guajava* tree have a long history of medicinal uses that are still employed today. Guava leaves and fruit juice has also been tested in treatment of infantile diarrhoea and the results showed that, those who were treated with guava recovered at 3 days which was shorter than the controls and the study concluded that guava had good curative effect on infantile Rotoviral enteritis (Wei *et al*., 2000).

Psidium guajava or guava is a plant in the family Myrtaceae along with clove, allspice and eucalyptus. Native to tropical America, it is now cultivated in many tropical and subtropical countries for its edible fruit (Perez *et al*., 2008). Guava leaves, roots, and fruits have been used for the prevention and treatment of diarrhea (Lutterodt, 1989; Almeida *et al.,* 1995) and a high level of antibacterial activity was detected in guava leaves (Hidetoshi and Darnto, 2002). In several studies, guava showed significant antibacterial activity against common food-borne diarrhea-causing bacteria such *as Staphylococcus* species, *Shigella* species, *Salmonella* species, *Bacillus* species, *E. coli, Clostridium* species and food spoilage bacteria such as *Pseudomonas* species (Lutterodt, 1989; Abdelrahim *et al.,* 2002; Jaiarj *et al.,* 1999; Baby Joseph, 2011).

In this paper, attempt was made to study antibacterial properties of leaves of *Psidium guajava* Linn in various solvent extract against human bacterial pathogens. From the results, it was concluded that leaves extract of *Psidium guajava* Linn plant was shown effective and efficient result against bacterial pathogen used. *Psidium guajava* leaves could serve as good source of antibacterial agents.

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MATERIAL AND METHODS

The *Psidium guajava* leaves were collected, cleaned and dried in shade drying at room temperature for 2 weeks. Five grams of powder were used for crude solvent extraction Chloroform, Ethanol, Petroleum Ether and water. Extract was filter out and filtrates with residue was used. The solvent was then evaporated to dryness under reduced pressure and the extracted compound was used for the antibacterial assay. The bacterial strains used for the test were *Staphylococcus aureus Escherichia coli*, *Pseudomonas aeruginosa* and *Salmonella typhi.* Muller Hinton agar and Nutrient broth was used as the media for the culturing of bacterial strains. Loopful of bacterial cultures were inoculated in the nutrient broth and incubated at 37°c for 24 hours. Anti-bacterial activities of plant extracts were tested separately using disc diffusion method (Bauer *et al.*, 1966). The suspensions of the bacterial strains were prepared corresponding to 0.5McFarland scale and swabbed on to the surface of sterile Mueller–Hinton agar plates. Sterile filter paper discs (6mm in diameter) 50µl of each extracts; air dried to eliminate residual solvent and were placed on the surface of the inoculated plates. The discs impregnated with the mother solvents of each extracts served as the control and were placed on the same plate. The plates were incubated at 37°c for 24 hours. The assessment of antibacterial activity was done based on the measurement of the diameter of inhibition zone formed around the disc.

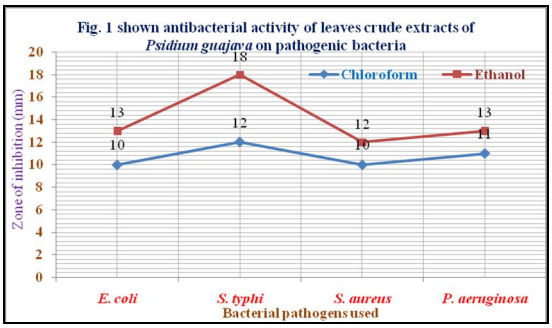
RESULT AND DISCUSSION

Plant leaves is used as medicines against gastroenteritis, diarrhoea and toothache by those who cannot afford or don't have access to antibiotics. The present study screened the antibacterial effects of leaves crude extracts of Guava. These extracts were treated against *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella typhi*. Guava leaves inhibited the growth of *Salmonella typhi* to maximum extent (18 mm) shown in table 1.

Table 1: Antibacterial activity of leaves crude extracts of *Psidium guajava* on pathogenic bacteria

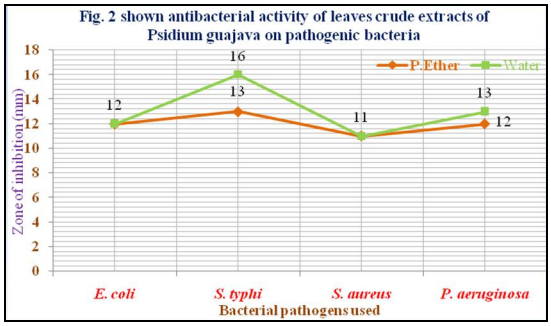
Sr. No.	Plant Leaves extract	Bacterial Pathogen used			
		E. coli	*S. typhi*	*S. aureus*	*P. aeruginosa*
1	Chloroform	10	12	10	11
2	Ethanol	13	18	12	13
3	P. Ether	12	13	11	12
4	Water	12	16	11	13

In the Fig. 1 shown that the antibacterial activity of leaves extract of Chloroform and Ethanol of *Psidium guajava* L against *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella typhi*. The result was found that Ethanol extract was shown maximum activity against *S. typhi* with zone of inhibition 18 mm and lowest activity against *S. aureus* with zone of inhibition 10 mm. Chloroform extract was shown maximum activity against *S. typhi* with zone of inhibition 12 mm and lowest activity against *S. aureus* and *E. coli* with zone of inhibition 10 mm.



In the Fig. 2 shown that the antibacterial activity of leaves extract of Chloroform and Ethanol of *Psidium guajava* L against *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa* and *Salmonella typhi*. The result was found that Petroleum Ether extract was shown maximum activity against *S. typhi* with zone of inhibition 13mm and lowest activity against *S. aureus* with zone of inhibition 11mm. Water extract was shown maximum activity against *S. typhi* with zone of inhibition 16mm and lowest activity against *S. aureus* and *E. coli* with zone of inhibition 11 mm.

The antimicrobial activity of guava leaf extracts have been associated with flavonoids such as mosin glycosides, quercetin, and quercetin glycosides (Arima and Danno, 2002). Polygalacturonase inhibitory proteins in the plant cell walls of guava are suggested to play a role in resistance to bacterial attacks (Deo and Shastri, 2003). However, the guava leaf extracts showed minimum activity against the fungal pathogens investigated in the present study. The oil has antibacterial activity particularly, *Bacillus subtilis, Staphylococcus aureus*. While the overall inhibitory effect of the essential oils in this experiment was less than for acetone, methanol and hexane its individual effect on *S. aureus* was greater and effect of volatile terpenoids on bacteria (Harrewijn *et al*., 2001) that is *Bacillus subtilis, Staphyllococcus aureus.*



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. The *Psidium guajava* Linn. Plant parts are used for the development of various industrial and pharmaceutical products. In this paper, attempt was made to medicinal properties of leaves of *Psidium guajava* Linn. in various solvent extract against human bacterial pathogens. The extracts of Guava leaves were shown better results against *Salmonella typhi* than other pathogens. From the results, it was concluded that leaves extract of *Psidium guajava* Linn. plant was shown effective and efficient result against bacterial pathogen used. *Psidium guajava* leaves could serve as good source of antibacterial agents.

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