



EFFECT OF MEDICINAL PLANTS AGAINST *STREPTOCOCCUS MUTANS* AND *STREPTOCOCCUS SANGUIS* IN PREVENTION OF DENTAL CARIES - AN *INVITRO* STUDY

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ABSTRACT

Now a days medicinal plants play a key role in health care systems for treating various diseases. The present study, the giant taro, leaves of *Alocasia macrorrhiza* (L.) G. Don. is a member of the family Araceae, the seeds of *Dolichos biflorus* L. (Fabaceae) and leaves of *Cassia occidentalis* L. (Caesalpiniaceae) were screened for their antimicrobial activity against human pathogenic bacterial for dental caries by agar well disk diffusion assay. The seeds of *Dolichos biflorus* L. and leaves of *Cassia occidentalis* L. extracts have showed excellent anti-bacterial activity against *Streptococcus mutans* and *Streptococcus sanguis* than standard drug chlorhexidine.

Key words:- Dental Caries, medicinal plants, *Streptococcus mutans* and *Streptococcus sanguis*.

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INTRODUCTION

Dental caries, which is also referred to as tooth decay or cavities, is one of the most common and widespread persistent diseases today and is also one of the most preventable. When you eat certain foods, the bacterium on your teeth breaks them down and produces acids that have the ability to seriously damage the hard tissues of your tooth. The result is the formation of dental caries (cavities) [1]. If the teeth and surrounding areas are not cared for properly, the bacteria will begin to digest the sugars left over from food in your mouth and convert it into acids as a waste product. These acids are strong enough to demineralize the enamel on your teeth and form tiny holes—the first stage of dental caries [2]. As the enamel begins to break down, the tooth loses the ability to reinforce the calcium and phosphate structures

of the teeth naturally through saliva properties and, in time, acid penetrates into the tooth and destroys it from the inside out. Conventional preventive methods such as the use of alcohol or antibiotics have proven effective in preventing dental caries. However, excessive use of chemicals has been reported to change the oral and intestinal flora and can cause other problems such as vomiting, oral cancer, etc [3]. Various compounds in plants inhibit bacterial growth and reduce the chance of development of resistant bacterial strain [4].

The giant taro, *Alocasia macrorrhiza* (L.) G. Don. is a member of the family Araceae. *Alocasia macrorrhiza* is recorded among cultivated medicinal as well as vegetable plants by the folklore of south Asia. Efforts are continued to identify the potential medicinal uses of the *Alocasia macrorrhiza*, especially on liver. An anti-fungal protein designated alocasin is isolated from the plant which can reduce the activity of HIV-1 reverse transcriptase [5].

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Traditionally *Dolichos biflorus* Linn. (family-Fabaceae), commonly known as Horse gram, is used in the treatment of cough, oedema and asthma. Horse gram seeds are useful in lowering cholesterol level, controlling skin rashes and boils, and treatment of kidney stones. Further, these are good source of antioxidants and also have antibacterial effects [6].

Cassia occidentalis L called as Kasmard in Sanskrit and Coffee Senna in English belongs to family Caesalpiniaceae. It is an ayurvedic plant with huge medicinal importance. Leaves of *C. occidentalis* plant have ethnomedicinal importance like paste of leaves is externally applied on healing wounds, sores, itch, cutaneous diseases, bone fracture, fever, ringworm, skin diseases and throat infection [7,8].

MATERIALS AND METHODS

Methodology

The extracts of leaves of *Alocasia macrorrhiza* (L.) G. Don. is a member of the family Araceae, the seeds of *Dolichos biflorus* L. (Fabaceae) and leaves of *Cassia occidentalis* L. (Caesalpiniaceae) were dissolved in distilled water in following concentrations 5 mg/ml, 10 mg/ml and 20 mg/ml so that 100 µl delivers 500µg/ml, 1000µg/ml and 2000 µg/ml respectively.

The following bacterial strain *Streptococcus mutans* and *Streptococcus sanguis* used for screening of antibacterial activity. The organism was isolated using selective media Mutans-Sanguis agar (Hi media M977) and maintained in nutrient agar slope at 4°C in the department of Microbiology, RVS Institute of Medical Sciences, RVS Nagar, Tirupathi Road, Chittoor, Andhra Pradesh 517127.

Antibacterial activity

Broth culture of the bacterial strains compared to Mac Farland's standard [9-11] 0.5 was prepared. Lawn culture of the test organisms were made on the Muller

Hinton agar (MHA-Hi media M1084) plates using sterile cotton swab and the plates were dried for 15 minutes. Using a sterile well cutter wells measuring 4 mm depth was made on the agar plate. 100 µl of different concentration of the extract is filled in the wells. 0.2% chlorhexidine was used as the positive control. The plates were incubated at 37°C overnight and the zone of inhibition of growth was measured in millimeters. All the tests were done in triplicate to minimize the test error.

RESULTS AND DISCUSSION

The antibacterial activity of the extracts at different concentrations was screened by disc diffusion technique and the zone of inhibition was measured in mm diameter. The results are showed in Table 1. The Leaves of *Cassia occidentalis* L. extract was more effective against *Streptococcus sanguis* with a zone of inhibition of 34 mm diameter (at conc. 2000 µg/ml) with *Streptococcus mutans* the zone size was found to be 39 mm diameter and Seeds of *Dolichos biflorus* L. extract showed a zone of 30 mm and 34 mm diameter (at conc. 2000 µg/ml) against *Streptococcus sanguis* and *Streptococcus mutans*. At the same time Leaves of *Alocasia macrorrhiza* (L.) extract showed a zone of 28 mm and 30 mm diameter (at conc. 2000 µg/ml) against *Streptococcus sanguis* and *Streptococcus mutans* respectively. Dental caries is one of the main reasons for the destruction and demineralized tissue of the teeth. *Streptococcus mutans* is the potential factor to initiate the cariogenic process among all oral Streptococci. The present study was carried to estimate the anti-bacterial activity of extracts of leaves of *Alocasia macrorrhiza* (L.), the seeds of *Dolichos biflorus* L. and leaves of *Cassia occidentalis* L. on caries causing organisms. The results obtained from our study shows that the three extracts have showed a very good antibacterial activity against *Streptococcus mutans* and *Streptococcus sanguis* [12].

Table 1: Antibacterial activity of extracts of leaves of *Alocasia macrorrhiza* (L.), seeds of *Dolichos biflorus* L. and leaves of *Cassia occidentalis* L. on *Streptococcus sanguis* and *Streptococcus mutans*

Extract/drug	Zone of Inhibition (in mm diameter)					
	500 µg/ml		1000 µg/ml		2000 µg/ml	
	<i>Strep. sanguis</i>	<i>Strep. mutans</i>	<i>Strep. sanguis</i>	<i>Strep. mutans</i>	<i>Strep. sanguis</i>	<i>Strep. mutans</i>
Leaves of <i>Alocasia macrorrhiza</i> (L.)	8	9	17	18	28	30
Seeds of <i>Dolichos biflorus</i> L.	9	11	19	21	30	34
Leaves of <i>Cassia occidentalis</i> L.	10	13	22	23	34	39
Chlorhexidine (0.2%)	21	-	29	-	37	-

CONCLUSION

Dental caries is one of the major health issues in public concerns for several reasons. If untreated this issue, this disease slowly leads to teeth loss, which causes chewing difficulties and aesthetic problems. This study explained that extracts of leaves of *Alocasia macrorrhiza*

(L.), the seeds of *Dolichos biflorus* L. and leaves of *Cassia occidentalis* L. have showed a very good antibacterial activity against *Streptococcus mutans* and *Streptococcus sanguis* than Chlorhexidine. So these extracts have a more potential for application in dental caries treatments and several other oral problems.

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