

Antimicrobial Activity of *Cassia auriculata* Flower Extract on Periodontal Pathogens: An In Vitro Study

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Abstract:

Periodontitis is a chronic inflammatory disease of the supporting tissues of the teeth which is caused by complex interaction between various micro-organisms. Periodontitis is a polymicrobial infection which mainly involves gram-negative and anaerobic pathogens which causes destruction of periodontal connective tissue and alveolar bone. Periodontal therapy involves mechanical debridement which disrupts the microbial colonization. The limitations of mechanical debridement are inability to access deeper areas of gingival sulcus and leading to periodontitis again. This lead to use of anti-microbial agents in management of periodontitis. With emergence of antibiotic resistance, there is need for discovery of new drugs. *Cassia auriculata* is a common shrub found in India and its medicinal properties have been extensively studied. There has been no study reporting its anti-microbial effect against periodontal pathogens. Hence this study evaluates the anti-microbial property of *Cassia auriculata* against anaerobic periodontal pathogens.

Key words: *Cassia auriculata*, Periodontal pathogens, Antibacterial activity

INTRODUCTION:

Periodontitis is a chronic inflammatory disease of the supporting tissues of the teeth which is caused by complex interaction between various micro-organisms and host immune response [1]. There are 700 different species of micro-organisms that harbour the oral cavity, but only few of those are thought to be potential periodontal pathogens [2]. Periodontitis is a polymicrobial infection which mainly involves gram-negative and anaerobic pathogens which causes destruction of periodontal connective tissue and alveolar bone [3]. Periodontal treatment aims at removing and reducing these micro-organisms [4]. Most common treatment for periodontal disease is scaling and root planing (SRP) which is said to be gold standard. However, the limitations of mechanical debridement are inability to access deeper areas of gingival sulcus and leading to periodontitis again. This lead to use of anti-microbial agents in management of periodontitis.

The emergence of anti-microbial drug resistance to human and animal pathogenic bacteria, and undesirable side effects of certain antibiotics, has triggered immense interest in the search for new antimicrobial alternatives of plant origin. The most important advantage claimed for therapeutic use of medicinal plants in various ailments is their safety besides being economical, effective, and easy availability [5]. Natural flora is said to play an important role in human life. India being a tropical country is known for its richness in medicinal plants and also for its traditional medicine practice for various ailments. In recent years, interest has been shifted to identifying and analysing

anti-microbial property of various parts of different medicinal plant.

Cassia auriculata L. commonly known as tanner's cassia, also known as "avaram" in Tamil language is a shrub belongs to the Caesalpiniaceae family and is found abundance in India. The shrub is especially famous for its attractive yellow flowers which are used in the treatment of skin disorders and body odour. It is widely used in traditional medicine for rheumatism, conjunctivitis and diabetes. It has many medicinal properties [6]. The antibacterial property of *Cassia auriculata* has been evaluated against *Staphylococcus aureus*, *Enterococcus faecalis*, *Bacillus subtilis*, *Salmonella typhi*, *Salmonella paratyphi A*, *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Vibrio cholerae* and *Shigella dysentria* [7]. However, literature pertaining to the antimicrobial activity of *Cassia auriculata* on periodontal bacteria has not been reported earlier. Therefore, the present study was conceptualized as the initial step to comprehensively report the antimicrobial potential of *Cassia auriculata* by assessing the inhibition zones with agar well diffusion method.

MATERIAL AND METHODS:

The study was an ex vivo experimental design. Ethical clearance to conduct the study was obtained from the institutional Ethical Committee of Saveetha Dental College.

Preparation of flower extract

Cassia auriculata flowers were obtained from Salem district of Tamil Nadu, India. Specimens were identified by a botanist for their authenticity. Flowers were dried at room temperature for ten days and then were blended using electric blender. The ethanol extract of Cassia auriculata flower was prepared by the Phytochemical Department of Siddha Central Research Institute, Chennai.

Collection of plaque sample

Patients diagnosed with chronic periodontitis were included in the study. The informed consent was obtained from the subjects. Subgingival plaque sample was collected from five chronic periodontitis patients from the deepest pocket using sterile curette. The site was isolate before procuring the plaque sample. This was then transferred to thioglycolate transport medium.

MICROBIOLOGICAL ASSAY:

The microbial inhibition assay was done using the agar well diffusion method. Adequate amount of Brucella isolation Agar with sheep blood were dispensed into sterile plates and allow solidifying under aseptic conditions. After the media was solidified; a sterile swab was used to transfer the plaque sample to the petridish following which, wells were made in the plates with the help of a cup borer (8.0mm). The well was filled with different concentrations of the extract (50, 100 and 500 mg/ml) and plates were placed in an anaerobic jar with gas-pak and incubated at $37 \pm 0.1^\circ\text{C}$ for 24 hours.

RESULT:

The results of the anti-microbial assay of the ethanolic extract of Cassia auriculata showed average zones of inhibition (mm) are recorded in (Table 1) concentration of 50mg/ml, 100mg/ml and 500mg/ml of Herbal extract is found to inhibit anaerobic micro-organisms in plaque sample.

The concentration which showed highest average zone of inhibition was 100mg/ml.

Zone of inhibition in mm			
	50mg/ml	100mg/ml	500mg/ml
Sample 1	16	18	18
Sample 2	15	14	12
Sample 3	14	17	14
Sample 4	15	15	15
Sample 5	16 (14.92)	19(16.6)	14(14.6)

Table 1: Zone of inhibition of various concentration of Cassia auriculata against periodontal anaerobic organisms

DISCUSSION:

This study shows the anti-bacterial activity of Cassia auriculata against periodontal pathogens.

Sub gingival plaque sample was used to evaluate the anti-microbial property for the reason, micro-organisms causing periodontal disease are in a state of biofilm. They are more resistant when compared to planktonic bacteria. Hence plaque sample was used rather than standard strains.

Other study done by anti-microbial effect of Cassia auriculata^[7], which studied the antibacterial property of Cassia auriculata has been evaluated against *Staphylococcus aureus*, *Enterococcus faecalis*, *Bacillus subtilis*, *Salmonella typhi*, *Salmonella paratyphi A*, *Escherichia coli*, *Proteus mirabilis*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Vibrio cholerae* and *Shigella dysenteriae*. But this study did not evaluate the effect of Cassia auriculata against anaerobic micro-organisms.

Study was done to evaluate the anti-microbial activity of Cassia auriculata against salivary microflora of mixed dentition age group^[8]. In this study, it was shown that anti-microbial activity was comparable with 0.2% chlorhexidine.

CONCLUSION:

From the present study, we can conclude that ethanolic extract of *Cassia auriculata* flower extract has antibacterial activity against anaerobic periodontal pathogens. But for more precise effect on specific micro-organisms, more studies with specific strain should be done.

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