

Screening of Ethanolic Extracts of Medicinal Herbal Drugs Against Oral Microbes

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ABSTRACT

Aim: The aim of the present study is to screen the ethanolic extracts of medicinal herbal drugs against oral microbes. **Objective:** In this study, 3 medicinal herbs were evaluated for antimicrobial activity against five common oral bacteria as a screen for potential candidates for the development of natural antibiotics. **Methods:** Ethanolic extracts of medicinal herbs were tested for activity against *Enterococcus faecalis*, *Lactobacillus acidophilus*, *Streptococcus mutans*, and *Streptococcus sanguis* grown in brain heart infusion (BHI) broth. A broth micro-dilution assay was used to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC). A disk diffusion assay was performed by inoculating bacterial cultures on BHI agar plates with paper disks soaked in each of the medicinal herb extracts. **Results:** The ethanolic extracts of many of the 3 medicinal herbs showed antimicrobial activity against the five types of pathogenic oral bacteria. The extracts of *Caralluma fimbriata*, *Hemidesmus indicus*, and Grape seed effectively inhibited the growth of oral bacteria and showed distinct bactericidal activity. **Conclusion:** These results suggest that alternative medicines with proven antimicrobial effects, such as *Caralluma fimbriata*, *Hemidesmus indicus*, and Grape seed may be useful for the treatment of dental diseases.

Key words: Anti cariogenic, Dental caries, Natural products Pathogenic, Oral bacteria.

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INTRODUCTION

Natural products have been used for thousands of years in Dental practice for the management of dental infections. Oral bacteria are the primary etiologic agents that cause dental caries/plaque.¹ Dental plaque plays the primary role in the pathogenesis of the dental caries. Dental plaque is a general term for the diverse microbial community found on the tooth surface, embedded in a matrix of polymers of bacterial and salivary origin. Plaque is found preferentially at protected and stagnant surfaces, and these are at the greatest threat of disease.¹

Caralluma fimbriata is an edible perennial herb grown in dry parts of Tamil Nadu, India.² It belongs to family Asclepiadaceae.³ It is well-known as famine food, appetite suppressant and thirst quencher.⁴ The stem of the plant is widely used to treat several ailments including diabetes, rheumatism, leprosy, peptic ulcer, inflammation, jaundice, dysentery, constipation, stomach pain, hepatitis B and C.⁵ It is listed in The wealth of India (1992) as a medicinal plant used for diabetes, rheumatism, leprosy, peptic ulcer, inflammation, jaundice, dysentery, constipation, stomach pain, hepatitis B and C.^{6,7}

Phytochemicals in fruits, vegetables, spices and traditional herbal medicinal plants play a protective role against many human chronic diseases including cancer and cardiovascular disease (CVD).⁵⁻⁷ On inves-

tigation, the phytochemicals discovered are flavone glycosides, pregnane glycosides, lupeol, megastigmane glycosides, bitter principles, saponins, various flavonoids.^{8,3,6} The plant possess beneficial effects as antihyperglycemic, antibacterial, antifungal, antinociceptive and antiproliferative activities.³

Caralluma fimbriata has potent resistance against fungal attack and hence can be used for the management of skin infections.

Grape seed extract has shown a wide variety of beneficial action when used as a dietary supplement. It contains proanthocyanidin which provides the antioxidant property in the extract.⁹ It has a greater action towards free radical scavenging, on comparison to others such as vitamin C and E.⁹ Flavanols, flavonols, stilbenes and phenolic acids are the other phenolic compounds present in *grape seed* extract.¹⁰⁻¹³ These phenolics are mainly distributed in the skin, stem, leaf and seed of grape.¹⁴ It has antioxidant and free radical scavenging, Anti microbial, Anti diabetic, Immuno modulatory, Anti cariogenic, Hepato protective activity.¹⁵

Root portion of *H. indicus* is also used in certain conditions like skin diseases, syphilis, elephantiasis, loss of appetite, blood purification and for kidney and urinary disorders and as well as in some biological activities namely hepatoprotective, antioxidant, antithrombotic, anti-ulcerogenic, anti-inflammatory, immunomodulatory.¹⁶

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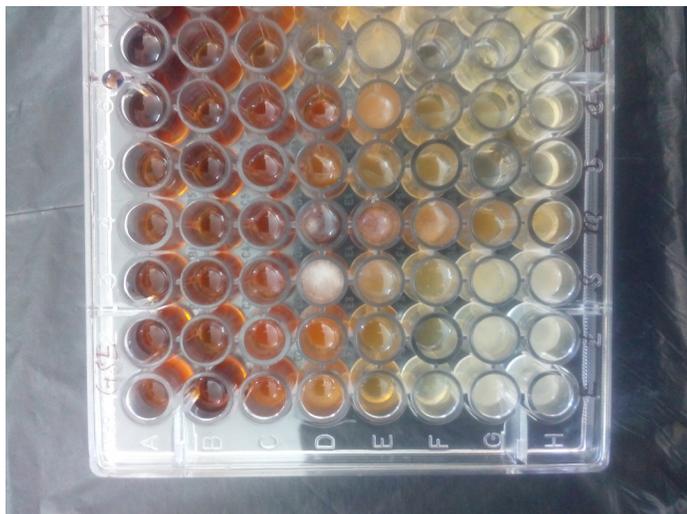


Figure 1: MIC studies of extracts

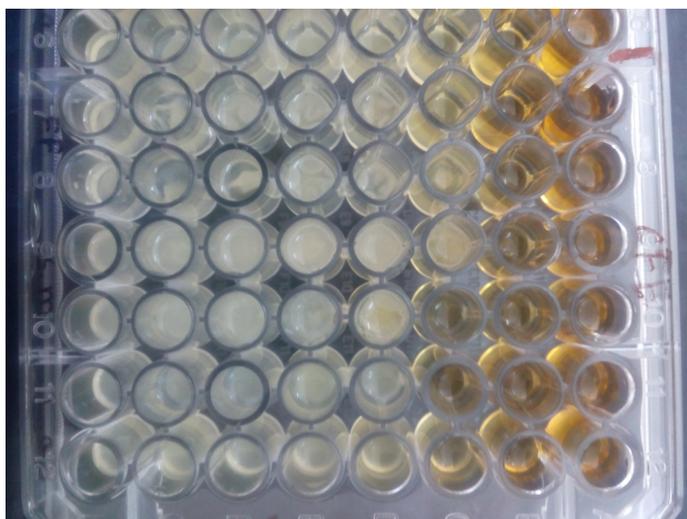


Figure 2: Showing MIC after incubation

| | <i>S. Mutans</i> | <i>E. Faecalis</i> | <i>S. Sanguis</i> | <i>L. acidophilus</i> |
|----------------------------|------------------|--------------------|-------------------|-----------------------|
| <i>Caralluma fimbriata</i> | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml |
| <i>Hemidesmus indicus</i> | 25 mg/ml | 50 mg/ml | 25 mg/ml | 50 mg/ml |
| <i>Grape seed extract</i> | 50 mg/ml | 50 mg/ml | 25 mg/ml | 25 mg/ml |

MATERIALS AND METHODS

Drugs

Grape seed, *Hemidesmus indicus*, *Caralluma fimbriata* is obtained from Green chem herbal extracts & formulations, Bengaluru.

ATCC strains of the chosen microbes were obtained.

S. Mutans - ATCC strain 25175

S. Sanguis - ATCC strain 10557

L. Acidophilus - ATCC strain 4356

E. faecalis- ATCC strain 29212

Medium –Tryptic soy broth –broth dilution method

Minimum inhibitory concentration¹⁷⁻¹⁹

To 100 μ L of sterile broth, 100 μ g/ml of the sample was taken as initial concentration in the first well of 96 well titre plates. This was serially diluted to obtain the dilutions of 50 mg/mL, 25 mg/mL, 15 mg/mL, 10 mg/mL, 5 mg/mL, 2.5 mg/mL and finally 1 mg/mL. The study was conducted using 96 well titre plates. Each concentration was inoculated with 0.01 mL of 24 hours bacterial cell suspension and incubated at 37°C for 24 hr. The presence of cloudiness or turbidity of the broth indicates positive growth. The concentration at which it inhibits the bacterial growth is considered as the Minimum Inhibitory Concentration (MIC).

RESULT AND DISCUSSION

In this study, All the three extracts tested at different concentrations show significant antibacterial efficacy. *Caralluma fimbriata* shows no growth at 25 mg/ml tested against *S. mutans* and *S. sanguis*, 50 mg/ml against *L. acidophilus* and *E. faecalis*. *Hemidesmus indicus* showed no growth at 25 mg/ml against *S. mutans*, *S. sanguis* and at 50 mg/ml against *E. faecalis*, *L. acidophilus*. *Grape seed* extract showed No growth at 50 mg/ml against *S. mutans*, *E. faecalis* and at 25 mg/ml against *L. acidophilus*, *S. sanguis* (Fig 1 & 2).

Disk diffusion assay, zone of inhibition is measured in mm. *Grape seed* extract showed maximum zone of inhibition 19 mm against *S. mutans*, and 22 mm against *L. acidophilus*.

Use of natural medicinal products have become vital in view of their safety. A novel estimate suggests that, in many developing countries people depends on traditional practitioners and medicinal plants to meet primary health care needs.

CONCLUSION

In conclusion, it is suggested that the significant antibacterial efficacy of the three extracts found in this study could be attributed due to the presence of polyphenols. However, further clinical trials are required to prove the anticariogenic efficacy.

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CONFLICT OF INTEREST

No conflict of interest are declared.

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