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Comparative evaluation of antimicrobial properties of four different extracts of *Embelia basal* (*Vidanga*) and 0.2% Chlorhexidine against *acidogenic* salivary microflora in mixed dentition age group.

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ABSTRACT

Dental caries is most commonly seen oral health problem regardless of age, gender, race and socioeconomic status with high prevalence in primary dentition. Dental caries is multifactorial in origin which includes host, dietary carbohydrates, oral commensal microorganisms (bacteria) and time. The increasing failure and side effects of popularly used chemotherapeutics and appearance of multiple drug resistance of multiple phenotypes in pathogenic bacteria lead to search of new compounds with antibacterial activity. Medicinal plants have been used to treat various illness since ancient times. There are no known side effects of herbal drugs and are easily available, non-narcotic and biodegradable. *Embelia basal* is one such medicinal plant which is known for its antifungal, antibacterial, antispasmodic, antioxidant and antihelminthic properties. Thus this plant can be used as a preventive drug in paediatric dentistry. In this study antibacterial properties of *Embelia basal* has been compared with commercially available Chlorhexidine which has known side effects.

Keywords: Caries, *Embelia basal*, Medicinal plant, chlorhexidine, saliva.

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INTRODUCTION

Medicinal plants have been used from centuries to treat various ailments. [1] They have many advantages over modern drugs which are being most commonly used. *Embelia basal* is a shrub from family Myrsinaceae. [2] Various species of *Embelia* are being used in ayurvedic medicines since ages to cure various diseases. It is found in western ghats which is known world *Heritage* for biodiversity. Roots, bark, fruits and leaves of *Embelia basal* has been documented for antibacterial, antifungal, antihelmintic, antioxidant and antispasmodic effects. [3] A modern drug like Chlorhexidine is most widely used antiseptic especially in dentistry. At low concentrations chlorhexidine is bacteriostatic and at high concentrations acts as bactericidal causing cell death by cytolysis. [4] Being a gold standard Chlorhexidine has many documented side effects such as alteration in taste sensation, of microflora in mouth and gut which may induce nausea and vomiting and diarrhea, discoloration of restorations, etc. [5] These drawbacks justify the search for new effective anticariogenic compounds that could be employed in caries prevention. Thus medicinal plants with minimal side effects has better acceptability for therapeutic purpose. This paper focuses on comparative evaluation of four different extracts of *Embelia basal* with Chlorhexidine as a standard antimicrobial agent against human salivary microflora.

MATERIALS AND METHODS

Collection and Identification of plant material:

The plant material (extracts) of the species was collected from local market with Authentication was performed, Pune, Maharashtra, India. *Embelia basal* / Authentication No / Specimen No. AHMA F-084.

Inclusion criteria

- Patients in mixed dentition period in age group of 6–12 years were selected.
- These patients had good general health with no history of antibiotic therapy and use of chemical anti plaque agents one months before the study initiation.
- They had moderate caries (DMFT/deft=3-6).

Exclusion criteria

- Patients who are not willing as a part of study.
- Patients with any known systemic disease.

Saliva collection

- Subjects were instructed not to eat or drink atleast 1 hour prior to collection of the samples.
- They were asked to rinse mouth with tap water before sample collection wait at least 10 minutes after rinsing before collecting saliva to avoid sample dilution.
- The resting whole saliva of the subjects was collected by passive drooling method into sterile glass tube, in a quiet well lit room in the morning time from 10am to 12pm.[6]
- Samples were then transferred to a calibrated cylindrical flask to measure the volume of each collected salivary sample.
- 5 ml of saliva sample was transferred to sterile vials.
- The salivary samples were labeled according to the patient's name.
- The samples were sent to the laboratory within 1 hour after saliva collection in an ice box.

Antimicrobial assay

- The agar well diffusion method was employed.
- Samples of each acetone, ethyl acetate, chloroform and ethanol extracts (200mg) were dissolved in respective solvents. Sterile 8.0 mm diameter of well were impregnated with different extracts .
- The salivary flora were inoculated on nutrient broth and incubated for 24 hours at 37 ± 0.1 °C.

- Adequate amount of Muller Hinton Agar were dispensed into sterile plates and allowed to solidify under aseptic conditions.
- The test samples of saliva (0.1ml) were inoculated with a sterile spreader on the surface of solid medium in plates.
- Following this, the sterile discs impregnated with different extracts were placed on agar plates.
- The bacterial plates were incubated at 37 ± 0.1 °C for 48 hours.
- After incubation all the plates were observed for zones of inhibition and the diameters of these zones were measured in millimeter.
- All tests were performed under sterile conditions.
- Chlorhexidine was used as positive control.

RESULTS AND DISCUSSION

In this study the plant viz Embelia Basal is selected based upon its traditional use to treat various illness since long time. It is commonly known by various names like –

Hindi: Babrang, Baibrang, Bayabirang, Bhingi, Baya Birang
 Kannada: Amti, Joladhanna, Vaivaling, Kanthree vilanga, Choladhanna, Maraharive
 Malayalam: Basaal, Cheriyanattam, Tsjeriam-cottam
 Marathi: Ambati, Ambuti, Kokla, Waiwarung
 Sanskrit: Bidanga, Krimighnam, Vellah, Vidanga
 Tamil: Vaivilangam.

The results of anti microbial assay of four different extracts of *Embelia basal* and chlorhexidine are tabulated(table No.1). All the Zones of inhibitions are measured in Millimeter(mm). The zones of inhibition are ranged from No-inhibition (NI) to 2.5mm which is near to zone of inhibition of commercially available synthetic drug Chlorhexidine which is 3mm. The following table shows results comparing zones of inhibition of four different extracts and 0.2% Chlorhexidine in mm.

Other studies have been done on Embelia basal mentioning medicinal properties of bark/fruits, etc. This study shows antimicrobial properties of leaf extract of Embelia basal which is comparable with 0.2% chlorhexidine which has less side effects. It is available commonly in western ghats and throughout India. It has been documented for having various properties (antimicrobial, antifungal, antihelmentic, antispasmodic and antioxidant) which can be used for the treatment of most commonly occurring diseases in children. Thus this plant can be used as for prevention of dental caries.

Graph showing zones of inhibition of four different extracts on salivary samples in mm

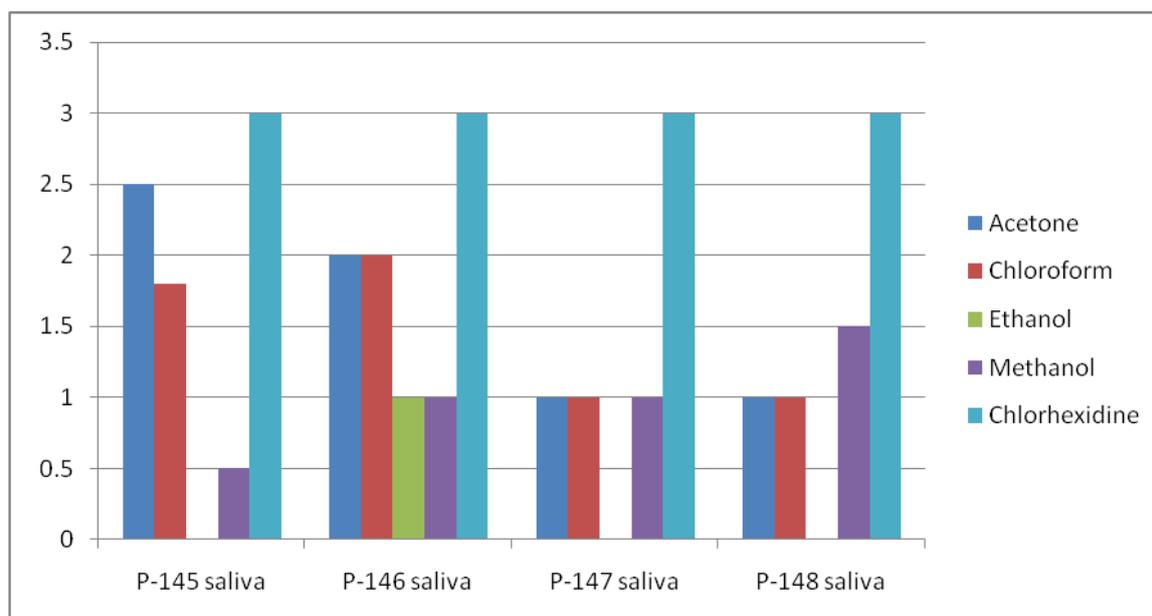


Table 1: Zones of inhibition of four different extracts on salivary samples in mm

S No	Acetone extract	Chlorofrom extract	Ethanol extract	Methanol extract	Chlorhexidine (Control group)
1.	2.5	1.8	Zero	0.5	3
2.	2	2	1	1	3
3.	1	1	Zero	1	3
4.	1	1	Zero	1.5	3



CONCLUSION

This study indicates that the four extract obtained from leaves of the medicinally important plant- *E. basal* revealed appreciable antimicrobial activity similar to but less than ‘Clohex’ as control. Acetone extract of ‘*Embelia basal*’ was found to be most effective anti-microbial against the salivary micro flora as compared to other extracts. The study also confirmed the antimicrobial potentials of the plant, thus supporting its folklore application as a preventive remedy for various microbial diseases. The findings of the present investigation offer a scientific support to the traditional use of the plant.

REFERENCES

[1] Kamboj VP. Herbal medicine. Current science. 2000 Jan 10;78(1):35-9.

[2] Deshpande RR, Kakade P, Panvalkar PS, Varghese VK, Kamble GS, Deshpande NR. A Comparative Evaluation of Antimicrobial Activity of Various Extracts of *Embelia basal* Against Salivary Microflora of Mixed Dentition Age Group. Research Journal of Pharmaceutical, Biological and Chemical Sciences January-February. 2014;5(1):131.

[3] D Barbade Ko, Datar Ag. Antibacterial Activity, Free Radical Scavenging Potential, Phytochemical Investigation And In-Vivo Toxicity Studies Of Medicinal Plant *Embelia Basaal* (R. & S.) A. Dc. Asian J Pharm Clin Res. 2015;8(2):171-7.

[4] Karpiński TM, Szkaradkiewicz AK. Chlorhexidine–pharmaco-biological activity and application. Eur Rev Med Pharmacol Sci. 2015 Apr;19(7):1321-6.

[5] Deshpande RR, Kakade PK, Panvalkar PS, Varghese VK, Kamble GS, Deshpande NR. A Comparative evaluation of antimicrobial activity of acetone extract of *Embelia basal*, clohex, and S-flo against salivary microflora of mixed dentition age group. Journal of Pharmacy Research Vol. 2011 Oct;4(10):3496-7.

[6] Salimetrics. Saliva Collection and Handling Advice 3rd edition 2012.