

Comparison of Anti-Microbial Effect of Pudina, Ginger and Clove Extract on Streptococcus Mutans and Enterococcus Faecalis: In-Vitro Study

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Abstract: ***Objective:** To compare and evaluate the efficacy of alcoholic extracts of Pudina, Ginger and Clove extract on Streptococcus Mutans and Enterococcus Faecalis. **Methods:** An Experimental design, in vitro study, Lab setting was done. Methanolic extract of Pudina, Ginger and Clove were prepared by cold extraction method. The extract then diluted with an inert solvent, dimethyl formamide, to obtain concentration of 10% extract. The extract, were then subjected to microbiological investigation to determine a wider inhibition zone against Streptococcus mutans and Enterococcus Faecalis. The zone of inhibition was measured in millimeters. **Results:** At the Effect of 10 % concentrations of Clove, Mint & Ginger extracts on Enterococcus Faecalis & Streptococcus Mutans, 10% concentration of Ginger extract showed widest zone of inhibition among all three different ingredients. **Conclusion:** Ginger extract demonstrated highest antimicrobial property against Enterococcus Faecalis & Streptococcus Mutans amongst all three ingredients.*

Keywords: Antimicrobial activity, Indian spices, Streptococcus Mutans, Enterococcus Faecalis.

1. Introduction

Dental disorders are widely acknowledged as serious public health issues across the globe. Numerous epidemiological studies have shown that tooth decay is mankind's most frequent disease. Dental caries is one of the most frequent human illnesses that affect most people. As a result, there is an urgent need to promote conventional preventative interventions that are acceptable, widely accessible, and cost efficient.

Herbal treatments have been used to cure a variety of infectious disorders throughout human history. In many developing nations, plant-based products still play a significant role in therapeutic treatments for basic healthcare. For most people on Earth, plants still serve as their primary source of medications. According to the World Health Organization, 80% of the world's population primarily uses traditional medicine, and a significant portion of traditional medicines employ plant extracts or their active components.

The most traditional method of healing that has ever been used is the usage of herbs. The herbal remedies come in a variety of forms, including ointments, liniments, incisions, powders, liquids, or mixes that may be consumed raw or cooked. Ethno medicine makes use of many plants' roots, barks, and leaves.

Cloves are utilized in Chinese medicine, Indian Ayurvedic medicine, western herbalism, and dentistry where the essential oil is used as a painkiller for dental issues. The fragrant flower buds known as cloves are found on Syzygium aromaticum, a tree in the Myrtaceae family. One of the most valuable spices, clove has been used for generations to preserve food and for a variety of medical uses.

The rhizome of the plant Zingiber officinale, sometimes known as ginger or ginger root, is used as a spice, medicine,

or delicacy. One of the most popular nutritional condiments eaten worldwide is ginger.

Mint, also known as Mentha arvensis, is a perennial fragrant herb that is used for both culinary and medicinal purposes. It is a member of the Labiatae family and genus Mentha. The plant, which was originally indigenous to Europe, was spread around the globe by travelers, soldiers, and merchants. Mint is now grown primarily for its pharmacological, medical, and culinary use in North America, Africa, Australia, and Asia.

In Indian culture, both cities and countryside employ clove, ginger, and mint. They are widely accessible and often eaten by Indians. Even though there have been several studies looking at the potential medical benefits of clove, ginger, and mint, there is still some uncertainty surrounding research on the Enterococcus Faecalis and Streptococcus Mutans species. Therefore, we conducted this research to determine how Enterococcus Faecalis and Streptococcus Mutans were affected by clove bud extract, ginger extract, and mint extract.

2. Material and Methods

The present in-vitro study was conducted to compare and evaluate the efficacy of alcoholic extracts of Pudina, Ginger and Clove extract on Streptococcus Mutans and Enterococcus Faecalis.

Preparation of extracts:

Ginger, Clove roots and Mint leaves were obtained from market and were dried in sunlight. The dried ingredient was then powdered finely. 100 g of each finely powdered ingredient was then macerated with 500 ml of 100% methanol. It was then subjected to filtration with Whatman filter paper to obtain a clear filtrate. The filtrate so obtained was reduced at a low temperature of <60°C to obtain a solid residue of Ginger, Clove and Mint extract. From 100 g of each powder dissolved in 500 ml of methanol, 5 g of residue

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(extract) was obtained, so the yield was 5% w/w.

Preparation of concentrations:

1 g of each extract was dissolved in 10 ml of dimethyl formamide to obtain 10% concentration of the extract.

Collection of the microorganisms:

Pure strains of *Enterococcus Faecalis* and *Streptococcus Mutans* were obtained from Microbial type Culture Collection and Gene Bank, Chandigarh (MTCC).

Preparation of culture media:

E. faecalis and *S. mutans* were added to nutrient broth which was incubated at 37° for 24 h. It was then sub-cultured onto nutrient agar plate and incubated at 37° for 24 h. The inoculum for antimicrobial activity was prepared by adjusting the density of an organism to approximately 108 colony forming units/ml with the help of 0.5 McFurland opacity standards. Finally, it was inoculated on blood agar plate by lawn culture method.

Ditch plate method:

Ditches will be made in petri-dishes by using a punch. These ditches will be filled with the equal amount of prepared extract. This procedure will be repeated for all the three extracts. Plates will then be incubated at 37°C for 48 h, after which zone of inhibition will be measured.

Study procedure:

Antimicrobial susceptibility testing

The ditch plate method was used to test the antimicrobial activity. Ditches were prepared on blood agar plates with the help of the punch having 6-mm diameter. On each petri dish, four ditches were made and labelled them with all three ingredients respectively. 50 µl of 10% extract was introduced into equal sized ditches made on petri dishes. The plates were left for 1hr at room temperature and then incubated at 37°C for 48 h and examined for zone of inhibition. The average of those zones was recorded in millimetres.

3. Observation and Results

Table 1 and Table 2 shows the Effect of 10 % concentrations of Clove, Mint & Ginger extract on *Enterococcus Faecalis* & *Streptococcus Mutans*. In both of them Ginger with 10% extract showed the highest antimicrobial activity amongst all three of them.

Concentration 10%	Zone of inhibition (mm) <i>E. Faecalis</i>			
	Z ₁	Z ₂	Z ₃	Mean ± SD
Clove	9.12	9.24	9.00	9.20±0.06
Mint	8.08	8.88	8.24	8.30±0.30
Ginger	9.96	9.86	10.20	10.02±0.14

Concentration 10%	Zone of inhibition (mm) <i>S. Mutans</i>			
	Z ₁	Z ₂	Z ₃	Mean ± SD
Clove	8.02	8.42	8.18	8.20±0.18
Mint	8.0	7.80	8.10	8.00±0.12
Ginger	10.0	9.80	10.40	10.12±0.14

4. Summary and Conclusion

Ginger extract demonstrated the highest antimicrobial

activity against *Enterococcus Faecalis* & *Streptococcus Mutans* amongst all the three ingredients at 10% concentration.

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