

# Antimicrobial Effect of Clove Oil (Laung) Extract on *Enterococcus faecalis*

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## ABSTRACT

**Introduction:** Dental diseases are recognized as major public health problems throughout the world. Clove, a perennial aromatic herb belonging to the family Myrtaceae, is an important culinary plant with immense medicinal use. **Aim:** The aim was to evaluate the efficacy of alcoholic extracts of clove (Laung) on *Enterococcus faecalis*. **Materials and Methods:** Materials used includes clove (Laung), micro-organisms (*E. faecalis* - Microbial type culture collection), agar plates, bloodagar plates, petri-dish, scale, punch, distilled water, weighing machine, centrifugal machine, sterile bottles. Ditch plate method is employed in this case after the clove oil extract and the microorganisms are obtained. **Results:** At 5% concentration, clove extract had no antimicrobial activity while 10% and 50% concentrations showed antimicrobial activity against *E. faecalis* - Antimicrobial activity was observed with 5%, 10% and 50% clove extracts. Antimicrobial activity increased as the concentration increased from 5 to 50%. **Conclusion:** From the results obtained from the study it can be concluded that clove had antimicrobial activities against *E. faecalis*.

**Keywords:** Clove oil, *E. faecalis*, Antimicrobial effect

## INTRODUCTION

Dental diseases are recognized as major public health problems throughout the world. Numerous epidemiological studies showed that tooth decay is the most common affliction of mankind.<sup>[1]</sup> Dental caries is steadily increasing in the underdeveloped and developing countries. Treatment is expensive and not a realistic option for the poor. Hence, there is an urgent need to promote traditional preventive measures that are acceptable, easily available, and cost-effective.<sup>[2]</sup> The term “Danta-shastra” i.e., dentistry in Ayurveda is not new; it all started with chewing sticks and has come of age to mouthwashes.<sup>[3]</sup>

Many infectious diseases are known to be treated with herbal remedies throughout the history of mankind. The World Health Organization reported that 80% of the world’s population rely chiefly on traditional medicine and a major part of the traditional therapies involve the use of plant extracts or their active constituents.<sup>[4]</sup> Clove (*Syzygium aromaticum*), a perennial aromatic herb belonging to the family Myrtaceae, is an important culinary plant with immense medicinal use. They are native to the Maluku Islands in Indonesia and are commonly used as a spice. Cloves are commercially harvested primarily in Indonesia, India, Madagascar, Zanzibar, Pakistan, Sri Lanka - and the largest producer, Pemba Island, just off the coast of Tanzania.<sup>[5]</sup>

So, the study was undertaken to evaluate the efficacy of alcoholic extracts of clove (Laung) on *Enterococcus faecalis*.

## MATERIALS AND METHODS

The present *in-vitro* study was conducted to evaluate the antimicrobial efficacy of different concentration of clove (Laung) extract against *E. faecalis*.

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## Preparation of clove extracts

Clove roots were obtained from market and were dried in sunlight. The dried roots were then powdered finely. 100 g of finely powdered clove 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 <math><60^{\circ}\text{C}</math> to obtain a solid residue of clove extract. From 100 g of clove powder dissolved in 500 ml of methanol, 5 g of residue (extract) was obtained, so the yield was 5% w/w.

## Preparation of different concentrations of clove extract

0.5 g of extract was dissolved in 10 ml of dimethylformamide to obtain 5% concentration of the extract. 1 g of extract was dissolved in 10 ml of dimethylformamide to obtain 10% concentration of the extract and with the same procedure 50% concentration was made.

## Collection of the microorganisms

*E. faecalis* Microbial type culture collection (MTCC) was procured from MTCC Chandigarh.

## Preparation of culture media

*E. faecalis* MTCC was added to nutrient broth which was incubated at  $37^{\circ}$  for 24 h. It was then sub-cultured onto nutrient agar plate and incubated at  $37^{\circ}$  for 24 h. The inoculum for antimicrobial activity was prepared by adjusting the density of an organism to approximately  $10^8$  colony forming units/ml with the help of 0.5 McFurand 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 of clove. This procedure will be repeated for the three concentrations of clove extract. Plates will then be incubated at  $37^{\circ}\text{C}$  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 labeled for various concentrations of clove extract.  $50\ \mu\text{l}$  each of 5%, 10%, and 50% clove extracts were introduced into equal sized ditches made on petri dishes.

The plates were left for 1 h at room temperature and then incubated at  $37^{\circ}\text{C}$  for 48 h and examined for zone of inhibition. The average of those zones was recorded in millimeters.

## OBSERVATION AND RESULTS

Table 1 shows the effect of various concentrations of clove extracts on *E. faecalis*. There was no zone of inhibition observed with 5% clove extract. Zone of inhibitions of 8.0, 8.0, 9.0 mm were observed with 10% extract with mean zone of inhibition of 8.33 mm. Zone of inhibitions 11.0, 10.0, 11.0 mm were observed with 50% clove extract with mean zone of inhibition of 10.66 mm.

## DISCUSSION

Medicinal plants continue to be an important therapeutic aid for alleviating the ailments of humankind.<sup>[6]</sup> Today, there is a renewed interest in traditional medicine and an increasing demand for more drugs from plant sources. This revival of interest in plant-derived drugs is mainly due to the current widespread belief that “green medicine” is safe and more dependable than the costly synthetic drugs, many of which have adverse side-effects.<sup>[7]</sup>

In India, the use of different parts of several medicinal plants to cure specific ailments has been in vogue from ancient times. India is rich in medicinal plant diversity.<sup>[8]</sup> Clove belongs to the family Myrtaceae. The clove tree is an evergreen that grows up to 8-12 m tall, with large leaves and sanguine flowers grouped in terminal clusters. The flower buds initially have a pale hue, gradually turn green, and then transition to a bright red when ready for harvest. Cloves are harvested

**Table 1: Effect of various concentrations of clove extracts on *E. faecalis***

Concentration clove oil	Zone of inhibition (mm)			
	Z <sub>1</sub>	Z <sub>2</sub>	Z <sub>3</sub>	Mean
5%	0.0	0.0	0.0	0.0
10%	8.0	8.0	9.0	8.33
50%	11.0	10.0	11.0	10.66

*E. faecalis*: *Enterococcus faecalis*

at 1.5-2.0 cm long, and consist of a long calyx that terminates in four spreading sepals, and four unopened petals that form a small central ball.

Cloves are used in Indian Ayurvedic medicine, Chinese medicine, and western herbalism and dentistry where the essential oil is used as an anodyne (painkiller) for dental emergencies. The essential oil is used in aromatherapy when stimulation and warming are needed, especially for digestive problems. Topical application over the stomach or abdomen is said to warm the digestive tract. Applied to a cavity in a decayed tooth, it also relieves toothache. Herbal medicines like clove are abundantly available, easily accessible, economically feasible, and culturally acceptable and may possess minimal side-effects and hence can be recommended for long term use. In addition, clove oil is used in the preparation of some toothpastes, laxative pills, and clovacaine solution, which is a local anesthetic used in oral ulceration and inflammation. Eugenol (or clove oil generally) is mixed with zinc oxide to form a temporary tooth cavity filling.

In our study, no antimicrobial effect was observed with 5% clove extract. 10% extract showed some antimicrobial effect with a mean zone of inhibition of 8.33 mm. The maximum antimicrobial effect was exhibited by 50% extract with a mean zone of inhibition of 10.66 mm.

The results of the current study could not be compared with other studies as this is the first study of its kind. Further, the composition of clove extract at 50% might be such that it has a maximum antimicrobial potential, perhaps this needs to be confirmed by further studies.

## SUMMARY AND CONCLUSION

Antimicrobial activity was observed with 5%, 10% and 50% clove extracts. Antimicrobial activity increased as the concentration increased from 5 to 50%. Thus from the results obtained from the study it can be concluded that clove had antimicrobial activities against *E. faecalis*.

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