# Poster Title

The antibacterial activity of “Satureja Hortensis” extract and essential oil against oral bacteria

# Introduction

Dental caries and periodontal diseases are two of the most important infectious diseases in the community at present.[1,2] Accumulation of microbial plaque on tooth surfaces is one of the first stages of caries process and periodontal diseases.[3] Different mechanical and chemical plaque control techniques have been introduced. However, many individuals do not properly use mechanical plaque control techniques.[4,5] In 2002, emphasis was put on the use of mouth rinses by the International Association for Dental Research as an adjunct to control plaque.[6] Due to their side effects, including a change in taste and formation of stains on the teeth, and also the presence of chemical agents such as alcohol, preservatives, and synthetic pigments, many patients are not interested in the long term use of chemical mouth rinses.[7-9] Therefore, in recent years, the idea of the use of herbal agents with antibacterial effects in the formulation of mouth rinses has drawn some attention to minimize complications.

# Aims

The aim of this study was to determine the antibacterial effects of Satureja hortensis extract and its essential oil (EO) on Streptococcus salivarius¸ Streptococcus sanguis, and Streptococcus mutans as important bacteria in early supragingival dental plaque formation.

# Methods

In this in vitro study, different concentrations of S. hortensis extract and its EO were prepared using double dilution method. The disc diffusion method was used to determine antibacterial activity. Based on these measurements, the minimal inhibitory concentration value was reported for each bacterium. Antibiotics used as positive controls in this study were erythromycin (15 µg) and tetracycline (30 µg). t-test and ANOVA were used for statistical analysis ($P < 0.05$).

# Results

Aqueous and methanolic extract did not show significant antibacterial activity, but the EO significantly inhibited the growth of the test bacteria compared to positive control ($P < 0.05$). High concentrations of EO processed greater antimicrobial effects against three oral bacteria than other low concentrations ($P < 0.0001$). For S. mutans, the inhibition effect of tetracycline 30 µg was similar with 50% ($P = 0.789$) and 25% ($P = 0.158$) dosages of the EO. For S. salivarius, the effect of tetracycline 30 µg was similar to 50% dosages of the EO ($P = 0.122$). For S. sanguis, the effect of erythromycin 15 µg was lower than 50% ($P = 0.0006$) and 25% ($P = 0.003$) dosages of the EO. The inhibition effects of all concentrations of EO were higher for S. sanguis. S. salivarius and S. sanguis are more sensitive than S. mutans to S. hortensis EO.

Table 1- Average of inhibition zone of bacteria

| Microorganism | | Dosage of essential oil (%) | | | | | | Negative control (-) | Positive control (+) |
|---|---|---|---|---|---|---|---|---|---|
| | | 1.5625 | 3.125 | 6.25 | 12.5 | 25 | 50 | | |
| Average of inhibition zone (mm) | Streptococcus mutans | -- | -- | 13.3 | 15.3 | 18 | 20.3 | - | 20 |
| | Streptococcus salivarius | -- | 11.5 | 12.16 | 16.3 | 19.16 | 23.3 | - | 26 |
| | Streptococcus sanguis | -- | 11.3 | 17 | 18.6 | 22 | 28.83 | - | 17 |

Negative control: Dimethyl sulfoxide
Positive control: Tetracycline 30 Kg/disc for mutans and salivarius, Erythromycin 15 Kg/disc for sanguis.

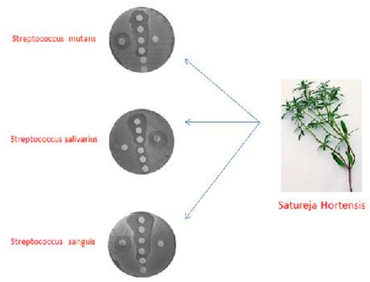


Table 2- MIC values of Satureja hortensis essential oil against oral bacteria

| Microorganism | PTCC | MIC (%) |
|---|---|---|
| Streptococcus mutans | 1683 | 3.125 |
| Streptococcus salivarius | 1448 | 1.5625 |
| Streptococcus sanguis | 1449 | 1.5625 |

# Conclusion

Due to the strong antibacterial effect of S. hortensis EO on the oral bacteria growth, it can be served as herbal mouth rinse, while to confirm this antibacterial effect, further clinical studies are necessary.

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