# EXPERMINTAL SELF DISINFECTING ALGINATE MODIFIED USING SILVER NITRATE, CHOLOROHIXIDINE AND GREEN SYNTHESIS

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## Introduction

Disinfection of alginate impression materials is a mandatory step to prevent cross-infection not only to the operator and patient but also to the laboratory technicians. However, post-setting disinfection could compromise the dimensional accuracy and properties of alginates. Thus, the aim of this study was to incorporate CHX, silver nitrate and green synthetized nano silver particles to dental alginate for pre and post setting self-disinfection.

## Methods

**Methods:** Conventional alginate impression material was used in this study. 0.2 % silver nitrate ($AgNo_3$ group) and 0.2 % chlorohexidine (CHX group) solutions were prepared using distilled water to be used for alginate preparation. Moreover, an aqueous plant extract solution was prepared from *Boswellia* sacra (*BS*) oleoresin and used to reduce silver nitrate to form nano silver particles that were used for preparation of a third modified group of dental alginate (*BS*+Ag group). Chemical analysis of the plant extract was performed by GC/MS analysis while characterization of the nanoparticles was carried out by SEM.

Agar disc diffusion assay was used to test the antimicrobial activity against *Candida albicans, Streptococcus mutans, Escherichia coli, Staphylococcus aureus,* and *Micrococcus luteus* [1]. Agar plates were incubated at 37 ± 1 °C for 48 h to allow the microorganisms to grow. Diameters of the circular inhibition zones formed around each specimen were measured digitally using AutoCad software. Elastic recovery of alginate was measured according to ISO 1563:1990 using a circular split mold of 12.5 mm diameter and 20 mm height. Specimens were gradually loaded up to 12 N, and then, the samples were gradually unloaded to allow for recovery from the deformation and elastic recovery was calculated [2]. Tear strength was evaluated using a Zwick testing machine until failure at a crosshead speed of 500 mm/min.

## Results

GC/MS analysis of the plant extract revealed the presence of 42 volatile and semi volatile active compounds. The CHX, $AgNO_3$ and the *BS*+Ag modified groups were effective and showed significantly higher inhibition zones compared to the control group against all tested strains (Fig. 1). One-way analysis of variance (ANOVA) showed statistically significant difference in the mean values of tear strength and elastic recovery between all the four tested groups with $AgNO_3$ group reporting higher mean values compared to the others and the control. All the tested groups showed elastic recovery greater than 95 % and tear strength values within the acceptable documented ranges (Table 1).

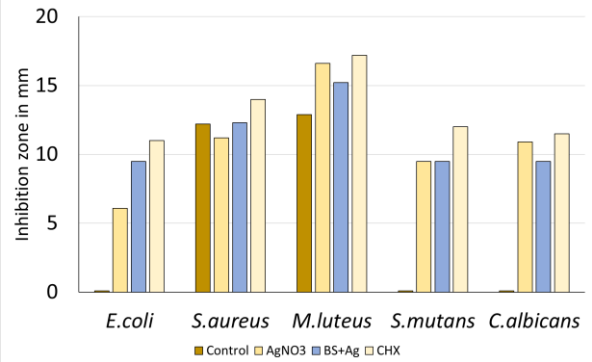


*Figure 1: Mean inhibition zones in mm of all tested groups against five microbial strains.*

| | Control | AgNO3 | *Bs*+Ag | CHX |
|---|---|---|---|---|
| ER | 96.9 % | 98 % | 97.8 % | 97.7 % |
| | 0.4 | 0.3 | 0.7 | 0.7 |
| TS | 0.79 | 0.84 | 0.66 | 0.82 |
| | 0.15 | 0.08 | 0.16 | 0.2 |

*Table 1: Mean and standard deviation of the elastic recovery (ER) in percentages and tear strength (TS) in N/mm of all tested groups.*

## Discussion

Silver nitrate, CHX and the green synthetized silver nano particles could be promising inexpensive potentials for preparation of a self-disinfecting alginate impression material without affecting its performance.

## References

1. Ginjupalli K, et al. J Prosthet Dent, 115:722-8, 2016.
2. International Standards Organisation (ISO), Specification for alginate impression material, 1563, 1990.