

Dentin Bonding Evaluation To Identify Quaternary Ammonium Concentration For Antibacterial Adhesive Formulations

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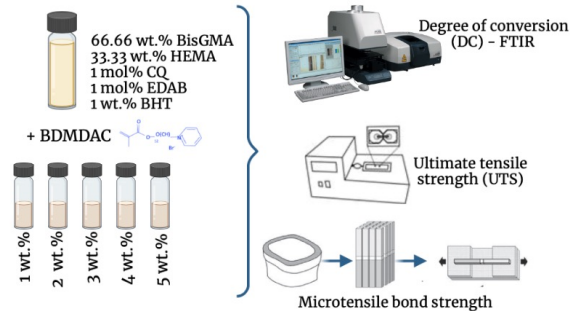
Introduction

Bacterial colonization of the resin-dentin bonding interface harshly shortens the lifespan of composite restorations¹. An antibacterial dental adhesive can potentially inhibit biofilm growth in this critical area². The incorporation of antibacterial compounds should not impair the core properties of the intended dental materials³.

Objectives

Exploring the effects of different concentrations of a quaternary ammonium compound, presenting hydrocarbon chain length of 12 and chloride as halide ion, benzyldimethyldodecylammonium chloride (BDMDAC), on the physical and mechanical bonding properties in dental adhesives.

Materials & Methods



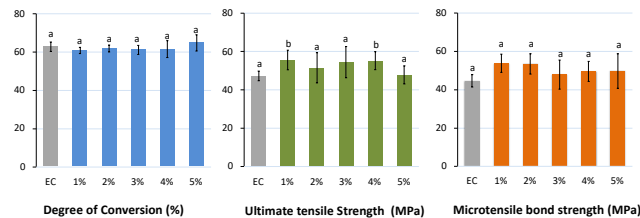
Results

All formulated adhesives have shown an increasing trend with increasing BDMDAC percentage, but no statistically significant difference noticed.

The degree of conversion ranged from (62.8±2.5)% for the control group to (64.8±4.2)% for 5 wt.% BDMDAC. There was no statistically significant difference among groups for the degree of conversion ($p > 0.64$).

Increased BDMDAC concentration up to 4 wt.% has increased the ultimate tensile strength while at 5 wt.% BDMDAC values were similar to control, ($p > 0.05$).

The microtensile bond strength values range from (41.7±6.5)% for the control group to (48.2±7.2)% for 5 wt.% BDMDAC.



Conclusion

The adhesive containing BDMDAC up to 4% has exhibited desirable physical/mechanical performance and bonding properties. These findings provide critical information on the superior concentrations to be assessed in further antibiofilm assays. BDMDAC has demonstrated promising properties for the resin-dentin bonding interface.

Acknowledgments

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ANOVA and Tukey tests were used for statistical analyses of the data.