

Determining the Minimum Inhibitory Concentration of Fulvic Acid on Early *Streptococcus mutans* Biofilm Formation

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Fulvic acid is an active ingredient in many homeopathic treatments. Shilajit is one such treatment that is mainly used in the Indian Subcontinent area. It is believed that fulvic acid has some remedial properties that can help with inhibition of many types of bacteria and various malignant diseases. In this experiment the effects of fulvic acid were analyzed on early *Streptococcus mutans* biofilm formation. *S. mutans* is an oral bacterium that contributes to the formation of dental caries forming bacterial biofilm on teeth. For the experiment, early *S. mutans* biofilm formation was treated with different concentrations of fulvic acid for 24 hours in sterile 96-well flat-bottom microtiter plates. The optical density (OD) of the *S. mutans* biofilm was then measured using a SpectraMax190, after staining with crystal violet. Data was analyzed on the knowledge that a greater OD is correlated to a greater bacterial biofilm. Results demonstrated that fulvic acid inhibited the growth of early *S. mutans* biofilm formation at fulvic acid concentrations greater than 5% (vol. %). After preliminary studies, different concentrations of fulvic acid closer to the estimated minimum inhibitory concentration (MIC) were applied to the *S. mutans* to find a more precise MIC of the fulvic acid on the biofilm growth. Upon completion of these various studies, fulvic acid was shown to inhibit early *S. mutans* biofilm formation and may show signs of oral health improvement if applied for human use.

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