The Inhibiting Effect of Aqueous Azadirachta indica (Neem) Extract Upon Bacterial Properties Influencing in vitro Plaque Formation

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Abstract:

The purpose of this investigation was to examine the inhibitory effects of aqueous extracts derived from the bark-containing sticks (Neem stick) of Azadirachta indica upon bacterial aggregation, growth, adhesion to hydroxyapatite, and production of insoluble glucan, which may affect in vitro plaque formation. Neem stick extracts were screened for minimal bacterial growth inhibition (MIC) against a panel of streptococci by means of a broth dilution assay. Initial bacterial attachment was quantified by the measurement of the adhesion of 3H-labeled Streptococcus sanguis to saliva-conditioned synthetic hydroxyapatite. The effect of the Neem stick extract upon insoluble glucan synthesis was measured by the uptake of radiolabeled glucose from 14C-sucrose. Aggregating activity of the Neem stick extracts upon a panel of streptococci was also examined. No inhibition of bacterial growth was observed among the streptococcal strains tested in the presence of ≤ 320 pg/mL of the Neem stick extract. The pre-treatment of S. sanguis with the Neem stick extract or the gallotannin-enriched extract from Melaphis chinensis at 250 ug/mL resulted in a significant inhibition of the bacterial adhesion to saliva-conditioned hydroxyapatite. Pre-treatment of saliva-conditioned hydroxyapatite with the Neem stick or gallotannin-rich extract prior to exposure to bacteria yielded significant reductions in bacterial adhesion. The Neem stick extract and the gallotannin-enriched extract from Melaphis chinensis inhibited insoluble glucan synthesis. Incubation of oral streptococci with the Neem stick extract resulted in a microscopically observable bacterial aggregation. These data suggest that Neem stick extract can reduce the ability of some streptococci to colonize tooth surfaces.