***In vitro* evaluation of zinc-doped glasses as anti caries agent**

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**Objectives:** Novel Zinc doped phosphate-based glasses (Zn-PBGs) are controlled delivery agents for zinc ions that may be effective in reducing demineralisation of enamel and may significantly impact growth of *S. mutans*, a caries-associated bacterium.

**Methods:** Novel Zinc doped (3mol% zinc and varying calcium concentrations, denoted as C11, C12 and C13) and control Zinc free PBG(C-PBG) rods (5 x 2mm) were produced using a conventional melt quenching method, at 11000C for 1hour. Degradation studies (0- 56h) were carried out using a weight loss method. Calcium, zinc, sodium and phosphate concentrations remaining in solution were measured by inductively-coupled optical-emission spectrometry (ICP-OES). The effect of Zn-PBG on bovine enamel was investigated under pH cycling conditions, using transverse micro-radiography (TMR). For antibacterial assay, *S.mutans* biofilms were grown in a constant depth film fermentor on hydroxyapatite, using artificial saliva. At 6, 24, 48 and 120h; discs containing biofilms were removed, subjected to 10 min exposure of Zn-PBG (C11) compared with 0.2% chlorhexidine or water. All the experiments were conducted in triplicates. The experiment was repeated 3 times and statistical analyses were conducted using the GraphPad software (San Diego, California, USA),Tukey-Kramer multiple comparison tests were used to compare values.

**Results:** The degradation rates of the Zn-PBGs were significantly (p<0.05) different (28.94μg mm-2 h-1 for C11, 25.56μg mm-2 h-1 for C12 and 19.72μg mm-2 h-1 for C13) compared with C-PBG (10.17μg mm-2 h-1). Zinc ion release rates were decreased as calcium concentration increased in the glasses, which correlated well with the weight losses of glasses. The biofilm study Zn-PBG (C11) achieved growth inhibition of *S. mutans* NCTC10449 at 48 and 120h compared with both controls, with a maximum of 0.95 log CFU reduction at 120 h (p< 0.04).

**Conclusions:** Novel Zn-PBGs inhibited *S. mutans* growth. Increasing calcium concentration in Zn-PBGs decreased antibacterial effects, C11 composition, may have potential use as an anti-caries agent.