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Curcumin-loaded Chitosan/Carboxymethyl Starch/ Montmorillonite bio-nanocomposite for reduction of dental bacterial biofilm formation

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ABSTRACT

A novel bio nanocomposite of Carboxymethyl Starch (CMS)-Chitosan (CS)-Montmorillonite (MMT) was developed for Curcumin delivery. To improve Curcumin entrapment into Cs-CMS-MMT, different ratios of Chitosan (Cs), Carboxymethyl Starch (CMS) and MMT were used. Particle size and Curcumin entrapment efficiency (EE) were highly affected by different formulation variables. Polysaccharide concentration, Cs-CMS ratio and sonication time had significant effect on particle size. MMT addition enhanced the entrapment efficiency. To optimize entrapment efficiency of Curcumin, statistical analysis was used, and an experiment based on screening design performed with two variants. Morphology and structural characterization of nanocomposite and Curcumin entrapment efficiency were analyzed. The optimal formulation had the average particles size of 35.9 nm with Curcumin entrapment efficiency of 91%. Finally, the antibacterial activity of bio nanocomposite against *Streptococcus mutans* was assessed. Curcumin-loaded bio nanocomposite hindered the formation of biofilm on dental models very effectively.

Keyword: Curcumin; Polysaccharide; Streptococcus mutans

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