FORMULATION OF METRONIDAZOLE LOADED CHITOSAN NANOPARTICLES FOR PERIODONTAL TREATMENT

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ABSTRACT

Local drug delivery of antimicrobials is one of the methods in controlling and treating periodontal disease. However, low drug penetration and rapid drug release are the major challenges in formulating local drug delivery systems. Thus, various drug targeting mechanisms and nanocarrier fabrication were developed to efficiently deliver the sustained release drug deep into the mucosa lining. In addition, chitosan is commonly used as nanocarriers for pharmaceutical drugs due to its biocompatibility and biodegradable properties. It can act as nanocarriers for loading antibacterial drugs on targeted sites and enhancing the bioavailability. The suitability of nanocarrier formulations for local drug delivery depends on various parameters, including the average particle size and polydispersity index (PDI). Therefore, the aim of this study was to identify the particle size and PDI of metronidazole antibiotics loaded with chitosan nanoparticles using ionic gelation. Metronidazole (MNA) nanoparticle was obtained by crosslinking chitosan (0.2% w/v) in lyophilized solutions containing metronidazole with tripolyphosphate (TPP) (0.2% w/v). The particle size and PDI of MNA nanoparticle were found to be 303.86 ± 62.78 nm and 0.497 ± 0.08, respectively (n=3). In this analysis, the nanoparticle diameter with moderate size distribution is capable of delivering the drug into the deeper layers of oral mucosa and prolonging the release of metronidazole directly to periodontal infection. Further study is needed to identify their therapeutic efficiency before *in vivo* evaluation.

Keywords: Metronidazole; Chitosan, Nanoparticle; Periodontal

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