

LOCAL DELIVERY OF ORNIDAZOLE-LOADED CHITOSAN NANOPARTICLES CONTAINING ETHYL CELLULOSE FILM FOR THE ENHANCED TREATMENT OF PERIODONTITIS

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ABSTRACT

- **Problem Statement:** Periodontal (gum) diseases are a “chronic inflammatory disease and infection” that destroy the tissue that support the teeth and finally, tooth loss. It involves the absorption of Alveolar bone, periodontal ligaments and formation of Pocket or space between tooth and gum is called as “Periodontitis”. The major cause is growth of microorganism in the pockets and release enzyme, toxins and stimulation of body’s immune response. Periodontitis is a very common and, is widely regarded as the second most common disease worldwide. In the United states has a prevalence of 30-50% of the population, but about 10% have severe form. This severe form is known as periodontitis.
- **Purpose:** The objective of this study was to resolve the problems in different dosage form which are given in systemic root. Topical site-specific delivery of ornidazole was reduced the side effects occurs by the systemic drug delivery like hypersensitivity, gastrointestinal intolerance and bacterial resistance because of ornidazole have a longer half-life 12 to 14 hrs. Nanoparticles loaded film having a potential to deliver small amount of drug with prolonged period of time.
- **Methods:** The Chitosan containing ornidazole nanoparticles was prepared by Ionic gelation mechanism using 1% Acetic acid. The nanoparticles were

evaluated for Particle size, Zeta potential, Drug content, antimicrobial study and In-vitro drug release study. After preparation of nanoparticles they have loaded in film. Nanoparticle loaded film was formulated by solvent casting method using ethyl cellulose as a polymer, Dichloromethane as a solvent and Dibutyl phthalate as a plasticizer. The film was evaluated for thickness uniformity, folding endurance, weight uniformity, surface pH, swelling index, Surface morphology study with scanning electron microscopy, In-vitro drug release study, antibacterial study, FT-IR study of film and comparison study with marketed formulation.

- **Results:** The optimized batch of nanoparticles was selected using Design of Experiment (DOE) Software⁷. F1 to F9 batch was prepared and evaluate all batches such as particle size, Drug content and In-vitro drug release study. After prepared F1-F9 batches, Design of experiment software ⁷ was applied and select the optimized batch. F2 have optimized batch, they have maximum drug release 82% and minimum inhibitory concentration. Optimized nanoparticles were loaded in ethyl cellulose film and they evaluate such parameters. In-vitro antibacterial of formulated nanoparticle containing ethyl cellulose film of ornidazole have similar activity as compare to standard drug sample. In compare to marketed formulation (Chlorhexidine mouth- wash) fabricated film have better antibacterial activity. The surface morphological study by scanning electron microscopy show that the molecules are uniformly distributed with nanoparticle in the formulation.
- **Conclusion:** Chitosan nanoparticles loaded ethyl cellulose film combination is the better carrier among the others for the preparation of ornidazole periodontal film for prolonged the drug action up to 7days.
- **Keywords:** Ornidazole and chitosan nanoparticles, nanoparticles loaded ethyl cellulose film, plasticizer (Dibutyl phthalate), Periodontitis, Local delivery.