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Development and Characterization of Controlled Release Photo Cross-Linked Implants for Ocular Delivery of Triamcinolone Acetonide

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Abstract : The objectives of the present research work were to develop and characterize biodegradable controlled release photo cross-linked implants of Triamcinolone Acetonide (TA) for the treatment of chronic ocular diseases. The photo cross-linked implants were prepared using film casting technique by mixing TA (2.5%) polyethylene glycol diacrylate (PEGDA 700), pore formers (mannitol, maltose, and gelatin) and the photoinitiator (Irgacure 2959). The resulting mixture was injected into moulds using 21 G and subjected to photocrosslinking at 365 nm. Scanning electron microscopy results demonstrated that more pores were formed in the films with the increase in the concentration of pore formers from 2%-10%. The maximum force required to break the films containing 2-10% of pore formers were determined in both dry and wet conditions using texture analyzer and found that films in a dry condition required a higher force to break compared to wet condition and blank films. In vitro drug release from photo cross-linked films were determined by incubating samples in 50 ml PBS pH 7.4 at 37 C and the samples were analyzed for drug release by HPLC. The films demonstrated a biphasic release profile i.e. an initial burst release (<20%) on the first day followed by a constant and continuous drug release in a controlled manner for 42 days. The drug release from all formulations followed the first-order release pattern and the combination of diffusion and erosion release mechanism. In conclusion, the developed formulations were able to provide controlled drug delivery to treat the chronic ocular diseases.

Keywords : controlled release, ophthalmic, PEGDA, photocrosslinking, pore formers
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