

Development of Biodegradable Wound Healing Patch of Curcumin

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Abstract : The objective of the present research work is to develop a topical biodegradable dermal patch based formulation to aid accelerated wound healing. It is always better for patient compliance to be able to reduce the frequency of dressings with improved drug delivery and overall therapeutic efficacy. In present study optimized formulation using biodegradable components was obtained evaluating polymers and excipients (HPMC K4M, Ethylcellulose, Povidone, Polyethylene glycol and Gelatin) to impart significant folding endurance, elasticity, and strength. Molten gelatin was used to get a mixture using ethylene glycol. Chitosan dissolved in acidic medium was mixed with stirring to Gelatin mixture. With continued stirring to the mixture Curcumin was added with the aid of DCM and Methanol in an optimized ratio of 60:40 to get homogenous dispersion. Polymers were dispersed with stirring in the final formulation. The mixture was sonicated casted to get the film form. All steps were carried out under strict aseptic conditions. The final formulation was a thin uniformly smooth textured film with dark brown-yellow color. The film was found to have folding endurance was around 20 to 21 times without a crack in an optimized formulation at RT (23°C). The drug content was in range 96 to 102% and it passed the content uniform test. The final moisture content of the optimized formulation film was NMT 9.0%. The films passed stability study conducted at refrigerated conditions ($4 \pm 0.2^\circ\text{C}$) and at room temperature ($23 \pm 2^\circ\text{C}$) for 30 days. Further, the drug content and texture remained undisturbed with stability study conducted at RT $23 \pm 2^\circ\text{C}$ for 45 and 90 days. Percentage cumulative drug release was found to be 80% in 12h and matched the biodegradation rate as tested in vivo with correlation factor $R^2 > 0.9$. In in vivo study administration of one dose in equivalent quantity per 2 days was applied topically. The data demonstrated a significant improvement with percentage wound contraction in contrast to control and plain drug respectively in given period. The film based formulation developed shows promising results in terms of stability and in vivo performance.

Keywords : wound healing, biodegradable, polymers, patch

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