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Solid lipid nanoparticles for topical delivery of Meloxicam: Development and *in vitro* characterization

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Solid lipid nanoparticles (SLN) are colloidal carrier systems representing a promising approach as a drug delivery system for topical application. Therefore, the objective of this investigation was to develop Meloxicam Solid lipid nanoparticles (MLX SLNs) for topical delivery The present study addresses the influence of different formulation compositions as lipid type and concentration in addition to surfactant concentration on the physicochemical properties and drug release profile of MLX SLNs. The nanoparticles were developed by modified high shear homogenization and ultrasonication technique using Geleol, Compritol 888 ATO or Precirol ATO 5 as solid core and poloxamer 188 as a surfactant. The results of the study revealed that MLX loaded SLNs showed extremely spherical shape having enriched core drug loading pattern with particle size (LD 90%) in the range of 325 to 1080 nm. A relatively high drug entrapment efficiency ranging from 61.94 to 85.33 % was obtained with zeta potential values lie between -17.6 to -38.6 mV indicating good stability. DSC examination revealed that MLX encapsulated in SLNs was in the amorphous state. According to the rheological study, all nanoparticulate systems exhibited non-Newtonian pseudoplastic flow with thixotropic behavior. in vitro release study showed a sustained release of MLX from the SLNs up to 48 h following Higuchi or zero order equations. Results of stability evaluation showed a long-term stability after storage at 4 °C for 12 months. In conclusion, SLNs with excellent physical stability, high entrapment efficiency and controlled drug release can be produced representing a promising carrier for topical delivery of meloxicam.

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