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Hafiz Muhammad Asif

University College of Conventional Medicine, Islamia university of Bahawalpur, Pakistan

Synthesis, Characterization and Evaluation of Anti-arthritic potential of curcumin loaded chitosan nanoparticles.

Background:

Curcumin is a versatile phytochemical derived from *Curcuma longa*'s dried rhizome, which have a lot of biological activities and have hydrophobic property.

Objectives:

The current study was conducted to fabricate, characterize and optimize Curcumin loaded chitosan and STPP Nanoparticles and improved bioavailability.

Methods:

Curcumin loaded Chitosan and STPP Nanoparticles were fabricated employing Ionic gelation method. Four formulations were developed based on the selected variable like STPP concentration, chitosan concentration, Rotations per minute, temperature and pH of chitosan solution. Nanoparticles were characterized for morphology, drug-polymer compatibility, percentage yield, mean particle size, encapsulation efficiency, release behavior, anti-inflammatory and antiarthritic activity.

Results:

FTIR spectroscopic analysis established the stable character of Curcumin in nanoparticles and produced sharp characteristic peaks representing at 3519cm⁻¹ of O-H group, C-OH bending at 1366cm⁻¹ and bending vibration of -CH bond of alkene group at peaks 728cm⁻¹ and 950cm⁻¹. Maximum percentage yield was found to be 60%. Encapsulation efficiency of Nanoparticles ranged from 30.2 µm to 76.7µm and 78.8 to 96.2% respectively. Curcumin release from optimized formulation was maintained in vitro up to 24 hours following first order release kinetics and non-fickian transport mechanism. 600 microgram per ml of Curcumin shows 52% anti-inflammatory activity by membrane stabilization method which is less than standard drug result whereas 71% antiarthritic activity by protein denaturation method which is equivalent to standard drug (Dicloran).

Conclusion:

The study concluded that Curcumin loaded Chitosan and STPP Nanoparticles can be formulated successfully by Ionic gelation method, which increased Curcumin absorption leading to reduced dosing rate and improved patient compliance.

Keywords: Curcumin nanoparticles, Chitosan, STPP, Ionic gelation, Anti-arthritic.