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Folate Engineered Microbeads Loaded with Anticancer Drug for Targeted Delivery as Cancer Targeted Vector

Zafar Khan[1] and Dr. Kanchan Kohli[2]
[1]Department of Pharmaceutics, SPER, Jamia Hamdard, New Delhi 110062
[2]Proof, Department of Pharmaceutics, SPER, Jamia Hamdard, New Delhi 110062

ABSTRACT

Background: Sulforaphane (SFN) is an isothiocyanate obtained from Brassicaceae vegetables. SFN is an anti-carcinogenic drug used in the treatment of breast cancer. Microbeads have various properties such as high stability, sustained release, acceptability, small particle size and controlled release of the drug molecules. A drug delivery system releases the drug in the particular body compartment at the controlled rate required for a specific treatment, especially in the study of controlled-release and slow release.

Methods: The present study aimed at the development and optimization of multiparticulate system consisting of Folate-alginate beads containing SFN for extended delivery using design of experiments by employing Box-Behnken statistical design (BBD).

Results: The result showed that QbD approach was successfully used in the development of Folate–alginate beads for the extended-release of SFN with predictable encapsulation efficiency, particle size and drug release properties. The quality of SFN loaded Folate-alginate beads were presented using Box–Behnken design.

Conclusion: The result showed that QbD approach was successfully used in the development of Folate–alginate beads for the extended-release of SFN with predictable encapsulation efficiency, particle size and drug release properties. The quality of SFN loaded Folate-alginate beads were presented using Box– Behnken design. All the independent variables, the concentration of sodium alginate (X1) 3.5-6.5 % w/v, folic-acid(X2) 0.8-2 % w/v and CaCl2 (X3) 4.5-9.5 % w/v were found to affect the time for 75% of the drug to be released (T75%), particle size and encapsulation efficiency either through linear, quadratic or interaction effects. The results revealed that polymer amount is a major factor affecting the drug release, particle size and encapsulation efficiency. The optimized formulation prepared using the predicted levels of factors provided the desired observed responses with T75% (Y1), particle size (Y2) and DEE (Y3) values of 17.2h, 1389.43µm and 82.6% respectively. In vitro release studies showed that the drug is released from the optimized formulation throughout 24 h in a sustained release manner.

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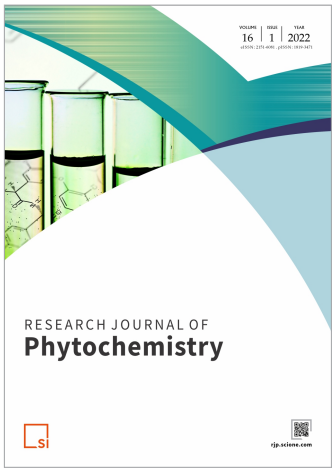

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