OP-19

DOI: 10.14232/syrptbrs.2024.39

Development of casein-fucoidan nanocomposites as a potential drug delivery system for daunorubicin

Nikolay Zahariev[1,2], Bissera Pilicheva[1,2]

[1]Department of Pharmaceutical sciences, Medical University of Plovdiv, Plovdiv, Bulgaria

[2]Research Institute at Medical University of Plovdiv, Plovdiv, Bulgaria

The aim of this study was to develop casein/fucoidan nanocomposites via polyelectolyte complexation and subsequent nano spray drying and to evaluate their potential for daunorubicin delivery. 3 (k-p) fractional factorial design was applied to estimate the effect of the independent variables (casein-fucoidan ratio, crosslinker concentration and spray intensity) over the dependent variables (production yield, particle size and zeta potential). Furthermore, the optimal production parameters for the preparation of blank nanocomposites were estimated. Based on an optimized "placebo" model of casein-fucoidan nanocomposites, three batches of daunorubicin-loaded particles were synthesized at varied crosslinker concentration and spray intensity. The obtained structures have average particle size within the range 355± 9 nm to 407 ± 8 nm, zeta potential from -30,61 ± 1,05 mV to -32,9 ± 1,35 mV and production yield between 77,39 ± 4,24 % and 92,51 ± 4,89 %. Drug loading was between 3,25 ± 1,04 % and 4,85 ± 0,82 % and encapsulation efficacy was in the range from 44,02 ± 1,80 % to 61,07 ± 2,24%. Delayed drug release was observed in all three batches, being more prominent in the batch that was crosslinked with 3% glutaraldehyde solution.

Acknowledgments: This research was funded by the European Union-NextGenerationEU, through the National Recovery and Resilience Plan of the Republic of Bulgaria project number BG-RRP-2.004-0007-C01.