Abstract

Formulation of Pullulan Acetate Nanoparticles Loaded with 5-fluorouracil †

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Introduction: The aim of this study was to obtain and characterize pullulan acetate-based nanoparticles, loaded with an anticancer agent, 5-fluorouracil (5-FU). The 5-FU agent is a first-line chemotherapeutic agent, employed in the treatment of various types of cancer, such as: gastric, pancreatic and esophageal cancer, breast cancer, head and neck cancer, cervical cancer, kidney cancer, etc. However, 5-FU has a short biological half-life, non-selective distribution, variable oral bioavailability and toxicity, which limits its therapeutic applicability. A way to overcome these limitations is by loading 5-FU in nanoparticles [1–3].

Materials and Methods: Pullulan was produced through a fermentation process, by Aureobasidium pullulans strain, and was further chemically modified with dimethylformamide, pyridine and acetic anhydride to obtain pullulan acetate. The 5-FU-loaded pullulan acetate nanoparticles were obtained by various methods: nanoprecipitation method, modified nanoprecipitation method and double emulsion method. Nanoparticles were characterized in terms of entrapment efficiency, size and polydispersity index, using spectrophotometric and dynamic light scattering techniques. Results: The 5-FU-loaded pullulan acetate nanoparticles were successfully produced by the three methods (nanoprecipitation, modified nanoprecipitation and double emulsion). All samples showed nanometric size and narrow polydispersity index. Conclusions: This study shows that pullulan and its derivatives have a great potential for the production of nanoparticles, with application in the biomedical field, including for the delivery of anticancer agents, as 5-fluorouracil.

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References

