CHARACTERIZATION OF POLYLATIC ACID INCORPORATED WITH NITAZOXANIDE FOR DRUG DELIVERY SYSTEM

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Introduction and objective:
Nanoparticles offer significant advantages in drug delivery due to their ability to improve bioavailability, control release and target specific tissues. Polylactic acid (PLA) is a biodegradable and biocompatible polymer, widely used for nanoparticle formulation[1]. By using solvent displacement techniques, PLA nanoparticles can be synthesized and loaded with active pharmaceutical ingredients. This protocol focuses on optimizing the preparation process to ensure stability, appropriate particle size and efficient drug encapsulation, contributing to improvement in nanomedicine area and controlled drug delivery systems. This work aims to develop a protocol for obtaining drug-loaded PLA nanoparticles.

Methodology:
To obtain PLA nanoparticles, PLA was dissolved in of THF and stirred at room temperature. A part of this solution were added dropwise to distilled water under stirring. The suspension was centrifuged, and the solution collected.
Hydrogel with different concentrations of NITAZOXAMIDE pharmaceutical were prepared before gamma irradiation, and than filtered, and lyophilized.
Samples before and after radiation were characterized by dynamic light scattering (DLS), thermal analysis and FTIR. PLA nanoparticles were successfully formed using the solvent displacement method.

Results and discussion:
The resulting suspensions were visually homogeneous, and no phase separation was observed. After drug addition, particle size remained stable, indicating effective encapsulation without significant aggregation. DLS measurements confirmed that the average diameter of the nanoparticles did not vary substantially compared to the unloaded samples, at 10 kGy total dose with 5 mM concentration. This suggests that gamma irradiation at this dose did not compromise the structural integrity or stability of the nanoparticles. Furthermore, the use of PLA and the optimized solvent-to-water ratio contributed to consistent particle formation and dispersion.

Conclusions:
The lack of significant size increase upon drug loading also indicates that the drug was efficiently embedded within the polymer matrix, rather than adhering to the nanoparticle surface. These results support the potential of PLA nanoparticles as stable drug carriers, even under irradiation conditions.

References
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