SYNTHESIS AND CHARACTERIZATION OF NANOSTRUCTURES FOR TO ENCAPSULATE TRYPANOCIDAL DRUGS

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Chagas disease is the result of an infection caused by the parasite *Trypanosoma cruzi*, its most severe clinical manifestation is the chagasic cardiomyopathy, which is potentially fatal. This disease is found in endemic areas of 21 countries in Latin America; besides, migratory movements have caused it to spread to the United States, Europe, Oceania and Canada. Conventional treatments are based on the use of drugs such as Benznidazole and Nifurtimox, which have shown limited effectiveness in the chronic phase of the disease. These drugs have low solubility, low permeability and high toxicity, which causes severe side effects in patients. Encapsulating molecules of the active principle of the drug into nanostructures could be an alternative to conventional treatment since they would improve the solubility and reduce its toxicity. Therefore, this research aims to synthesize and characterize polymeric nanostructures for transporting and delivering of trypanocidal drugs. Two types of nanostructures were synthesized, dendrimers of type poly (propylene) imine (PPI) of generation 3.0, 4.0 and 5.0, and nanoparticles of PLGA. Dendrimers were synthesized by the divergent method, using ethylene diamine and acrylonitrile as precursors. We used the nanoprecipitation method to develop the PLGA nanoparticles from polylactic acid and polyglycolic acid. The nanostructures were characterized by infrared (IR), proton nuclear magnetic resonance (HRMN), zetaziser and scanning electron microscopy. The results showed the synthesis of both dendrimers and PLGA nanoparticles. These nanostructures exhibited spherical shapes, with sizes between 4 and 10 nm for dendrimers and between 40 and 100 nm for PLGA. The IR analysis confirmed the synthesis of dendrimer generations 3.0, 4.0, and 5.0 by their characteristic absorption signals, in the regions near 1110 cm⁻¹, 580 cm⁻¹ and 796 cm⁻¹ respectively. In addition, we observed the typical absorption signals in the region near 3400 cm⁻¹ corresponding to primary amines. The results of IR were confirmed by HRMN. Both the dendrimers and the synthesized nanoparticles will allow the encapsulation of trypanocidal drugs, thanks to their cavities and hydrophobic nuclei, which will be stabilized by hydrogen bonds and hydrophobic interactions.

**Keywords:** Chagas disease, Dendrimer poly (propylene) imine, Nanoparticles of PLGA

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