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PRODUCTION OF LIPID-CORE NANOCAPSULES CONTAINING LYCOPENE-RICH EXTRACT FROM RED GUAVA (PSIDIUM GUAJAVA L.) WITH CYTOTOXIC ACTIVITY IN BREAST CANCER CELLS

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This study aims the development and characterization of lipid-core nanocapsules carrying lycopene-rich extract from red guava (LEG), and evaluating its cytotoxic activity in human breast adenocarcinoma cells (MCF-7). LEG was obtained from mature fruit (500g) by extraction with ethanol and characterized by UV-Vis spectrophotometry and high performance liquid chromatography. Lipid-core nanocapsules containing LEG (nanoLEG) were produced by interfacial deposition of the preformed polymer method. A control formulation without extract (empty nano) was produced. NanoLEGs were characterized by Dynamic Light Scattering (DLS), Polydispersity Index (IPD), Zeta Potential (ZP), pH, Encapsulation Efficiency, Nanoparticle Trace Analysis (NTA), Atomic Force Microscopy (AFM), and Transmission Electron Microscopy (TEM). Cell viability was evaluated by MTT (3-[4,5-dimethylthiazol-2-yl]-2,5-diphenyltetrazolium bromide) dye reduction method in MCF-7. The hemolytic activity assay was carried out spectrophotometrically in sheep blood. Variance analysis and Bonferroni's test were applied at GraphPad Prism. UV-Vis and chromatographic analysis revealed the presence of lycopene in the extract. DLS, NTA, PDI, ZP, and pH data from nanoparticles shown polydisperse samples, average sizes around 200 nm, negative surface charge, and pH <5.0, with unexpressive variation during the storage period (90 days), indicating stability of the system. The percentage of encapsulation was similar between formulations, varying from 95 to 98%, suggesting that LEG was efficiently encapsulated. The micrographs by AFM and TEM revealed spherical shape and heterogeneous distribution of sizes. NanoLEG significantly reduced ($p<0.05$) the viability of MCF-7 after exposure for 24 and 72 hours from the lowest concentration (6.25 to 200 μg/mL). NanoLEG did not affect the viability of sheep blood erythrocytes at the concentrations tested (6.25 to 200 μg / mL), indicating biocompatibility in the normal cell model used. Thus, lipid-core nanocapsules carrying lycopene-rich extracts from red guava can be a promising alternative in applications against breast cancer.