In recent years metal nanoparticle synthesis has evolved substantially, now being possible to control their shape, size and surface chemistry. Gold nanoparticles are one of the most important types of nanoparticles with biomedical application, due to their utilization in live tissue as contrast agents, delivery vehicles, therapeutics etc [1]. Nanoparticles are known to self-assemble into larger structures during the growth processes, which are governed by a delicate balance between electrostatic repulsion and Van der Waals attraction [2]. Many nanoparticle superstructures with new properties and applications have been developed, mimicking the behavior of efficient natural machines (e.g., enzymes, proteins, biopolymers, or viruses) [3].

**Methods**

A simple method for preparing gold nanoparticles (GNP) in aqueous solution has been developed by using heparin, with different concentrations, as reducing and stabilizing agent and HAuCl₄ as precursor. Colloidal gold GNP were prepared by chemical reduction of HAuCl₄ in the presence of heparin with major modifications as described previously by Guo et al. [4]. In a 100-mL round-bottom was added 100 μL chloroauric acid solution ( 1 g HAuCl₄ / 50 mL H₂O ) then, a solution of heparin (10 mg heparin/ 10 mL H₂O) was injected and stirred for about 300 minutes at 100ºC. All glassware used was cleaned in a bath of freshly prepared aqua regia solution (HCl:HNO₃ 3:1) and then rinsed thoroughly with H₂O prior to use. The characterization of the heparin reduced gold nanoparticles (GNP_HEP) were carried out by using UV-Vis, IR, TEM, Microscopy imaging, SERS spectroscopy, MTT and ROS studies.

**Results A: Nanoparticle characterization**

**Results B: Nanoparticle cytotoxicity**

Results B: Nanoparticle cytotoxicity

**References**


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