4th International Conference in Prophetic Medicine Research

DOI 10.14293/ICPMR.2020.558
Available at www.emiratesscholar.com

Environmentally-safe Synthesis of Gold and Silver Nano-Particleswith AL-Madinah Barni Fruit and their Applications in the Cancer Cell Treatments

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Abstract

Green synthesis of the Platinum nanoparticle of dates is carried out for examining their effect on various cancer cells. The extract solution of Dates (biodegradable surfactant) is used for this purpose. The bio-degradable plant-based surfactant, used in the study, occurs naturally, and no other reducing, or capping agent is used for cancer cell treatment. The aqueous extract solution of popular dates Ajwa and Barni acts as a stabilizing and reducing agent during the production of PtNPs at ambient condition because of simplicity, long-time stability, and cost-effectiveness. In order to achieve the best size and shape of nanoparticles, different ratio of extract and metal salt were mixed and developed. Additionally, nanoparticles of varying size were furnished by altering the pH of the reaction. Spectroscopic techniques like FTIR, X-ray Diffraction (XRD), EDX, thermos-gravimetric analysis (TGA), UV-vis, and transmission electron microscopy (TEM) were applied to identify PtNPs. In this study, electrochemical HPCL and high-performance liquid chromatography (HPCL) are combined for better understanding and effectiveness. The metabolites such as amino acid, sugar, organic acid, flavonoids, phenol, and minerals, in the Dates produced in Al-Madinah Al-Munawarah, have been analyzed with the help of the techniques employed in the study. PtNPs' anticancer activities were evaluated for different cancer cells including the colon carcinoma cells (HCT-116), breast cells (MCF-7), and hepatocellular carcinoma (HePG-2). Commonly used effective anticancer agent, Doxorubicin HCl, is used in the current study related to anticancer activity.