

EFFECTS OF GOLD NANOPARTICLES SYNTHESIZED USING WATER EXTRACT OF BROWN SEAWEED; *SARGASSUM GLAUDESCENS*

Zahra, A.^{1,2*}, Arbakariya, B. A.^{2*}, Maaruf, A. G.¹, Kamyar, S.³, Heshu, S.R.^{4,5}, Sahar, A.², Hemn, H.O.^{1,3*}, Daniel A.⁶,

^a Innovation Center for Confectionery Technology (MANIS), Faculty of Science and Technology, Universiti Kebangsaan Malaysia, Bangi, Selangor Darul Ehsan, Malaysia

^bDepartment of Bioprocess Technology, Faculty of Biotechnology and Biomolecular Science, Universiti Putra Malaysia, UPM Serdang, Selangor, Malaysia;

^cDepartment of Chemistry, Faculty of Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia

^dFaculty of Veterinary Medicine, Universiti Putra Malaysia, UPM Serdang, Selangor, Malaysia

^eFaculty of Veterinary Medicine, University of Sulaimany, Sulaimany City, Kurdistan Region, Northern Iraq

^fDepartment of Marine Biotechnology, Iranian Fisheries Research Organization, No. 297, West Fatemi Avenue, Tehran, Iran;

*Corresponding author: z_azhdari@yahoo.com

Based on data published in April 2011 by WHO about Deaths in worldwide, cancer is the third leading cause of death (after heart disease and stroke) in most of developed countries and the second leading cause of death (after heart disease) in Malaysia. Therefore, one of the challenges for Malaysia and the whole world is carrying out research on cancer in order to find its causes and method for therapy and prevention of this disease. Metal nanoparticle synthesis using seaweed extract shows rapid and non-toxic process which resulted to nano sizes having the greatest potential for biomedical applications. The current study was aimed to investigate the anticancer properties of gold nanoparticles synthesized using water extract of brown seaweed; *Sargassum glaucescens* (Au/S.G-NPs). The effect of 3.65±1.69 nm Au/S.G-NPs were studied on HeLa (cervical cancer) and 3T3 (mouse fibroblast) using tetrazolium dye MTT assay. Later on, *in vitro* apoptosis effect was evaluated using fluorescent microscopy, flow cytometry, and protease caspase activities. After 72 h treatment, MTT assay revealed highest and significant cytotoxic effect of Au/S.G-NPs dose and time-dependently against cervical cancer cells with IC₅₀ of 4.75 ± 1.23 µg/mL. On the other hand, Au/S.G-NPs showed no cytotoxic effect toward mouse fibroblast cells. Moreover, Au/S.G-NPs significantly ($P < 0.05$) arrests HeLa cells at G2/M phase and significantly ($P < 0.05$) activated caspases-3 and -9. The results revealed that Au/S.G-NPs can be further developed as chemotherapeutic compound for the treatment of cancers especially cervical cancer.