

Summary of the MSc thesis NO.,.... Faculty of Veterinary Medicine, Urmia University.

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Title of thesis: Production of nanoemulsion containing gallic acid and investigation of its anticancer effects on 4t1 cell line.

Summary:

Introduction and background: Breast cancer is the common type of cancer in women worldwide. Gallic acid is a polyphenolic acid compound with cytotoxicity properties against cancer cells. Since nanoparticles are a drug carrier model to deliver specific drugs to desired targets, producing nanoemulsions containing gallic acid and evaluating the anticancer effects of different concentrations of gallic acid nanoemulsions (0, 10, 20, 30, 40, 50, and 60 Micrograms per milliliter (ug/ml) on mouse breast cancer cell line was investigated in this study. In this study, gallic acid nanoemulsion was produced using lecithin and Tween 80. The physical and chemical properties as well as the stability of nanoparticles were evaluated in different environmental, temperature and time conditions. Then, its anticancer effects on 4T1 cell line were investigated with the help of MTT, trypan blue, neutral red and acridine orange-propidium iodide tests. Nanoparticles with an average size of 205 ± 1.3 nm, uniform dispersion of 0.2, zeta potential of -34 mV, encapsulation efficiency of $80.35 \pm 0.3\%$, stable and controlled release without changing properties in different environments, including Cell culture medium, mouse plasma and saline phosphate buffer were produced. The investigation of the stability of nanoparticles during two months of storage and at two temperatures of 25 and 4 degrees Celsius showed that the nanoparticles underwent a series of changes in physical and chemical properties with the passage of time. It was not statistically significant, which indicates the high stability of produced nanoparticles. The results of the cytotoxicity tests (MTT, neutral red and trypan blue) showed that the cell viability in the groups treated with different concentrations of gallic acid nanoemulsion was dose- and time-dependent and significantly lower than the group Gallic acid is free ($p < 0.05$). IC50 of gallic acid nanoemulsion in trypan blue test 48.23 ± 3.5 ug/ml, in MTT test 52.66 ± 4.5 ug/ml after 24 hours, 39 ± 1.1 ug/ml after 48 hours, In the neutral red test, 48.15 ± 5.7 ug/ml was obtained after 24 hours, and 43.05 ± 1.5 ug/ml after 48 hours. As for free gallic acid, it could not kill at least 50% of cancer cells in the concentrations used in this study within 24 hours in both the MTT and neutral red tests, but in the 48 hours in the MTT test at a concentration of ± 21.6 60.01 ug/ml and in the neutral rejection test at a concentration of 59.3 ± 3.11 ug/ml, it was able to kill at least 50% of cancer cells (IC50). The results of the acridine orange-propidium iodide test also showed that the number of apoptotic cells increased significantly after treatment with gallic acid nanoemulsion compared to the control group and free gallic acid, which indicates the greater power of the nanoemulsion form of the drug compared to It is free form. In general, it can be concluded that the produced nanoemulsion shows significant effectiveness on breast cancer cells compared to the free form and can be further studied as a breast cancer treatment method.

Keywords: gallic acid · Breast cancer· nanoemulsion