Hippuric acid nanocomposite enhances doxorubicin and oxaliplatin-induced cytotoxicity in MDA-MB231, MCF-7 and Caco2 cell lines.

ABSTRACT

Background: The aim of the current study is to design a new nanocomposite for inducing cytotoxicity of doxorubicin and oxaliplatin toward MDA-MB231, MCF-7, and Caco2 cell lines. A hippuric acid (HA) zinc layered hydroxide (ZLH) nanocomposite was synthesized under an aqueous environment using HA and zinc oxide (ZnO) as the precursors. Methods: The hippuric acid nanocomposite (HAN) was prepared by the direct reaction of a HA solution with an aqueous suspension of ZnO. Results: The basal spacing of the nanocomposite was 21.3 Å, which is average of four harmonics at 2θ = 8.32°, 12.50°, 16.68°, and 20.84°. This result indicates that the hippurate anion was successfully intercalated into the interlayer space of ZLH. The combinations of HAN with chemotherapy (drugs) has inhibited the cell growth of the MDA-MB231, MCF-7, and Caco2 cancer cells when compared to drugs alone. An IC50 value for the combination of HAN with doxorubicin toward MCF-7 is 0.19 ± 0.15 µg/mL and toward MDA-MB231 is 0.13 ± 0.10 µg/mL. Similarly, the IC50 for the combination of HAN with oxaliplatin toward Caco2 is 0.24 ± 0.11 µg/mL. In the antiproliferative results, the equal combination of HAN (0.5 µg/mL) with doxorubicin (0.5 µg/mL) has reduced the cell proliferation in MCF-7 and MDA-MB- 231 cells into 37.3% and 17.6%, respectively after 24 hours. Similarly, the antiproliferation percentage for equal combination HAN with oxaliplatin (5.00 µg/mL) toward Caco2 is 72.7% after 24 hours. Conclusion: The resulting combination HAN with drugs has exhibited higher inhibition in cells growth in all cancer cell lines

Keyword: Caco2 cell lines; Doxorubicin; Hippuric acid nanocomposite; MCF-7; MDA-MB231; Oxaliplatin; Zinc-layered hydroxide.