

Preparation and characterization of saponin-enriched extract of *Zizyphus spina-christi* and design of a novel saponin-phospholipid complex as an effective drug delivery tool

Zahra Nazemoroaya^a, Mohsen Sarafbidabad^{a*}

Abstract

Introduction:

Saponins are plant glycosides and possess great diversity in their structure. They are common in a variety of higher plants. Saponins display various biological activities. Recently intensive research has been focused on developing saponins for tumor therapies. But they have high toxicity effect in clinical uses. Herein, saponin-phospholipid complex have been synthesized in order to reduce the cytotoxicity, increase the efficiency and selectivity of saponin-enriched extract on melanoma cell line.

Methods and Results:

In this work, saponins were extracted from *Zizyphus spina-christi* using ethanol 70% as solvent. The ethanol extract was fractionated by liquid-liquid extraction process using chloroform, ethyl acetate and finally with water-saturated n-butanol. The presence of saponins was confirmed with FT-IR and UV spectroscopy. Then the nanocomplex was prepared using emulsion /solvent evaporation method and with various ratios from soybean lecithin:cholesterol:saponin extract. The generation saponin/phospholipid complex was demonstrated by FT-IR. Scanning electron microscopy (SEM) of the nanocomplex showed spherical shape and their size were lesser than 40 nm. Zeta potential of synthesised nanocomplex was -32 mV. The calculated entrapment efficiency was 81/82%. The synthesized nanocomplexes and saponins were analyzed by MTT for their toxicity on B16F10 cell line. The results showed high cytotoxicity of saponin-enriched extract of *Zizyphus spina-christi* and a decrease in cytotoxicity of nanocomplexes compared to saponin in cell culture.

Conclusions:

The results of this study demonstrated that saponin-enrich extract derived from *Zizyphus spina-christi* has a strong potential in controlling the cancer cell growth. Also synthesis of nanocomplexes of saponin/phospholipid can improve saponin effects and decrease its cytotoxicity.

Key words: Saponin, *Zizyphus spina-christi*, nanocomplex, phospholipid.

Authors' Affiliations:

^a Department of Biomedical Engineering, University of Isfahan, 2017, Iran;

Abstract Presenter:

Zahra.Nazemoroaya; M.Sc.
Department of Biomedical Engineering, University of Isfahan, Iran;
E-mail: z.nazem@eng.ui.ac.ir

*Correspondence:

Mohsen. sarafbidabad; Ph.D.;
Department of Biomedical Engineering, University of Isfahan, Iran;
E-mail: Mohsensaraf@gmail.com