Cardanol-based green nanovesicles with antioxidant and cytotoxic activities

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ABSTRACT

This manuscript describes the preparation of green nanovesicles by using cardanol as renewable starting material with embedded minor amounts of phthalazines, a class of heterocyclic bioactive compounds. The nanovesicles were prepared by stirring induced self-assembly in aqueous medium without involvement of any organic solvent. Dynamic light scattering studies and transmission electron microscopy revealed the formation of nanostructure with an average diameter in the range of 227_375 nm and a well defined spherical morphology. Potential antioxidant activity of nanovesicles were evaluated for the first time by 2,20-azino-bis-(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) scavenging assay and bleomycin-dependent DNA damage. Moreover, their cytotoxic effects were also investigated by 3-[4,5-dimethylthiazole-2-yl]-2,5-diphenyltetrazolium bromide (MTT) assay on different tumour cell lines. Unloaded nanovesicles showed moderate antioxidant and antitumoural activity that was further enhanced particularly by embedding the 2-[4-(4-Hydrazinophthalazin-1-yl)-phenyl]-isoindole-1,3-dione compound.

KEYWORDS

cardanol; green nanovescicles; phthalazines; bioactive nanosystems

1. Introduction

Fabrication of functional supramolecular structures from renewables is an area of exciting and intensive research. New environmentally friendly materials and processes can be designed combining the green chemistry principles with nanotechnologies for producing biocompatible and bioactive nanotools as new potential drug delivery systems. There are many examples of drug nanocarriers such as lipid particles and vesicular systems like liposomes, sphingosomes, niosomes etc.[1] Recently, liposomes are used in biomedicine as vehicles to deliver anticancer drugs and genes to targeted cancer cells helping to shield healthy cells from the drug toxicity and preventing concentration in vulnerable tissues.[2, 3]