

Antifungal organoselenium compound loaded nanoemulsions stabilized by bifunctional cationic surfactants.

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Over last few decades, organoselenium compounds have been extensively studied in organic and medicinal chemistry. Ebselen (2-phenylbenzisoselenazol-3(2H)-one, BSe) and its analogues have emerged as potential pharmaceuticals and promising catalysts of various oxidation reactions and potential pharmaceuticals. For instance, their biological interest relies on their antioxidant, anti-inflammatory and glutathione peroxidase-like activities as well as antimicrobial, antiviral and chemopreventive effects. One of the major obstacles for their practical use is poor water solubility. For this purpose the potential of dicephalic cationic surfactants, N,N-bis[3,3'-(trimethylammonio)propyl]alkylamide dichlorides, to form physically stable nanoemulsion-based drug carriers in the presence of a variety of oils (oleic acid, Capmul MCM and PG-8) and the organoselenium-derived cargo was explored. Nanoemulsions were characterized by visual and microscopic observations, as well as dynamic light scattering (DLS) measurements of particle size and distributions. Results of transmission electron microscopy (TEM) and DLS showed that nearly spherical droplets of very similar size were obtained, with oleic acid bringing best properties. Time-dependend size (DH) and ξ -potential measurements, dispersion stability test and kinetic stability studies with multiple light scattering (MLS) technique proved high colloid stability of the fabricated systems. Positively charged nanoemulsions with high ξ -potential values up to 87 mV showed no significant evolution in backscattering profiles. The nanoemulsions were evaluated for antimicrobial efficacy towards *Candida albicans* and its biofilm. Strong antifungal activity was observed, with deleterious morphological changes in cellular structures and yeasts cell surface alterations. In conclusion, the designed oil-in-water nanoemulsion-based carriers, stabilized by dicephalic cationic surfactants can comprise a promising delivery system for poorly water soluble organoselenium derivatives of efficient antimicrobial activities.

Słowa kluczowe

nanoemulsion, dicephalic cationic surfactants, ebselen,, organoselenium compounds, antimicrobial activity, *Candida albicans*

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