NON-TREATED AND UV-IRRADIATED *PAEONIA TENUIFOLIA* PETAL EXTRACT-LOADED LIPOSOMES

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Abstract

Paeonia tenuifolia L. petals contain bioactive compounds, such as phenolic acids, flavonoid glycosides and aglycones, anthocyanins, anthocyanidins, terpene derivatives, etc. However, the application of the mentioned bioactives from this source is rather low due to the fact that a higher amount of petals need to be collected in order to obtain a decent amount of these compounds, thus leading to the need for large meadow areas covered only in steppe peony. In addition, Paeonia petal bioactive compounds are characterized by their low solubility, stability, integrity, permeability, and consequently bioavailability. Therefore, the encapsulation of these hard-to-obtain P. tenuifolia petal bioactive molecules into liposomal particles can be advantageous. In the present study, P. tenuifolia petal extract-loaded liposomes were prepared using thin film method and characterized in terms of encapsulation efficiency (EE), vesicle size, polydispersity index (PDI), zeta potential, mobility, and radical scavenging potential before and after UV irradiation. The EE was high and amounted to >75%, while UV irradiation did not influence the mentioned parameter, i.e., UV irradiation did not cause the leakage of encapsulated compounds. The vesicle size was significantly high and amounted to 4959.7 ± 131.2 nm for non-treated and 5030.0 ± 73.6 nm for UV-irradiated liposomes, while the liposomal dispersion system was homogeneous and PDI was 0.252 ± 0.065 and 0.222 ± 0.025, respectively; the differences were not statistically significant. The zeta potential and mobility for the non-treated sample were -10.93 ± 0.38 mV and -0.857 ± 0.028 μmcm/Vs, respectively indicating lower stability of the liposomal system. However, UV irradiation caused a significant change in both parameters and reversal from negative to positive values; namely, the zeta potential was +7.70 ± 0.15 mV, while mobility amounted to 0.604 ± 0.012 μmcm/Vs. In the ABTS antioxidant assay, extract-loaded liposomes neutralized 63.1 ± 1.4% of the ABTS radicals, whereas after UV irradiation antioxidant potential was significantly lower (55.0 ± 1.3%). On the other hand, UV irradiation did not influence DPPH radical scavenging of the liposomal particle and the IC_{50} value was ~10.7 mg/mL in both cases (non-treated and UV-irradiated samples). Future experiments should be focused on the reduction of vesicle size of the obtained liposomes using sonication and/or extrusion and improvement of zeta potential and consequently stability with the aim to implement P. tenuifolia petal extract-loaded liposomes in food, functional food, pharmaceutical, and cosmetic products.

Keywords: *steppe peony, encapsulation, biological activity, encapsulation efficiency.*