Abstract

Breast cancer is the most common fatal disease among women. The conventional treatments raised concerns about reduced bioavailability, poor cellular uptake, emerging resistance, and unwanted toxicity. *Bergenia ciliata* has drawn increasing attention in the treatment of carcinoma due to its remarkable pharmacological activities. In this research, *Bergenia ciliata*-loaded silk fibroin nanoparticles were developed for controlled drug delivery to overcome drug resistance and toxicity. Silk fibroin, due to its distinct attributes such as biodegradability, biocompatibility, and exceptional mechanical properties, is a promising vehicle for delivering therapeutic drugs. In this study, breast cancer was induced by cadmium chloride (25 mg/Kg) in mice. After breast cancer induction, the groups were treated with Tamoxifen (25 mg/Kg), *Bergenia ciliata* (200 mg/Kg), FNP (25 mg/Kg), and BCFNP (25 mg/Kg) for 1 month. At the end of the trial, the serum levels of various proinflammatory cytokines, such as TNF-α, IL-6, and IL-10, and various metabolic enzymes, namely LDH, ASAT, ALAT, GSH, ALP, and MDA, were analyzed from the blood serum of all groups. However, the best result was exhibited by the group treated with *Bergenia ciliata* loaded fibroin nanoparticles (BCFNP) exhibiting the minimum level of pro-inflammatory cytokines, i.e., TNF-α (31.7 ± 1.4 pg/mL), IL-6 (20.2 ± 0.9 pg/mL), and IL-10 (25.4 ± 1.9 pg/mL), as compared to the CdCl2-treated group, i.e., TNF-α (57.0 ± 2.8 pg/mL), IL-6 (39.8 ± 1.6 pg/mL), and IL-10 (63.0 ± 2.8 pg/mL). Moreover, the BCFNPs treated group also showed favourable enzymatic level results, close to the control group. Histological analysis of BCFNPs treated group revealed normal mammary tissue structure. The UV spectra of FNPS and BCFNPs showed maximum absorption at 252nm and 292 nm, respectively. In conclusion, *Bergenia ciliata* loaded fibroin nanoparticles exhibit effective potential to treat tumors through targeted drug delivery.