ECMC-P 2025 Conference
The 1st International Electronic Conference on Medicinal Chemistry and Pharmaceutics
01–30 November 2025 | Online
MDPI

Liposomes for potential delivery of Aloe vera waste antioxidants

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INTRODUCTION & AIM

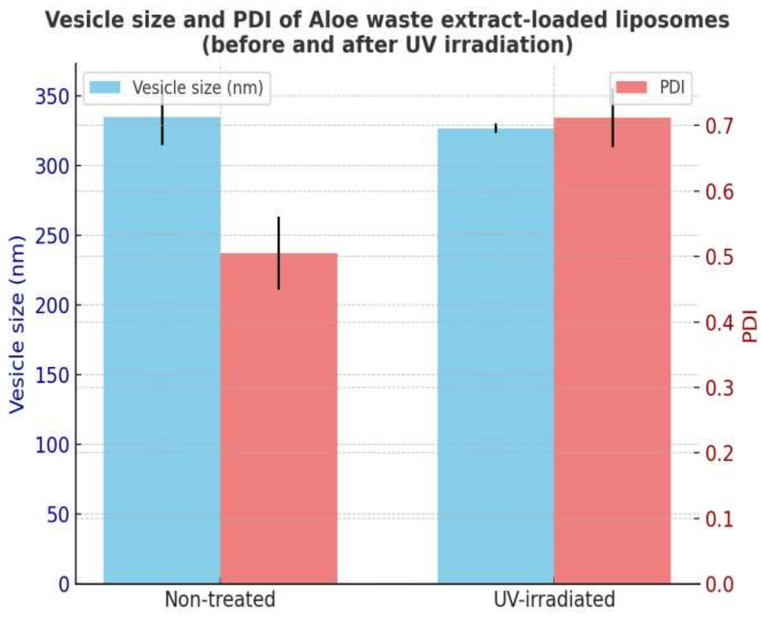
Aloe vera L. leaves possess bioactive principles, such as polyphenols, anthraglycosides, free anthraquinones, mono- and polysaccharides, polypeptides, terpenoids, sterols, chromones, lectins, fatty, amino, and organic acids, enzymes, and saponins. *A. vera* waste (leaves without aloe gel) is also rich in amino acids, organic acids, flavonoids, anthraquinones, lipids, minerals, vitamins, carbohydrates, pigments, as well as volatile organic components. Hence, the aloe by-product is recognized as being of significant worth after the extraction of its bioactives and their potential implementation in food and cosmetic products. The encapsulation of the mentioned bioactive compounds can improve their stability, bioavailability, activity, and prolonged release in various formulations.

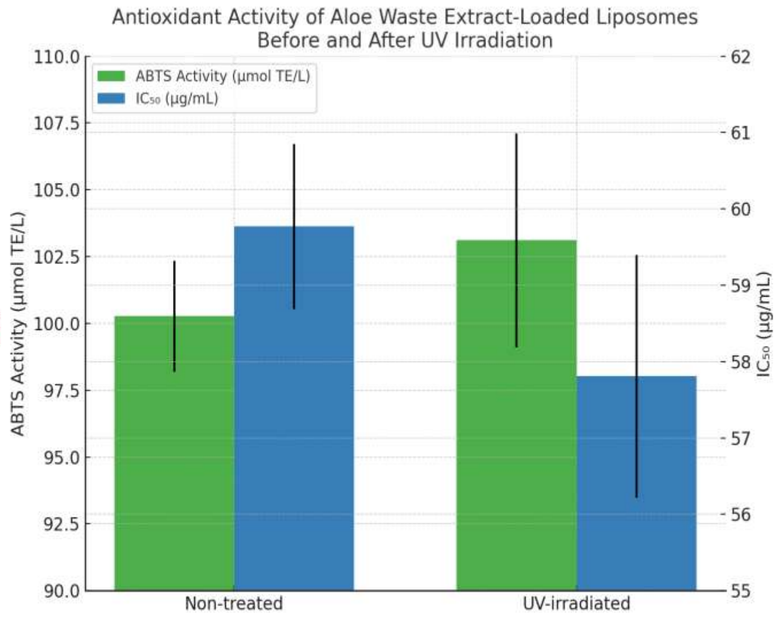
METHOD

Liposomes with aloe leaf waste extract were prepared using phospholipids and the pro-liposome technique, and their size, polydispersity index (PDI), and antioxidant potential before and after UV irradiation were examined using photon correlation spectroscopy and ABTS and DPPH assays, respectively.

RESULTS & DISCUSSION

The vesicle size of aloe waste extract-loaded liposomal particles was 335.00±20.55 nm (non-treated liposomes) and 326.63±3.43 nm (after UV irradiation), whereas the PDI values were very high, 0.505±0.056 and 0.712±0.045, respectively. The data mentioned above confirm the existence of nanoliposome vesicles in the non-uniform system. The anti-ABTS activity was 100.27±2.08 µmol Trolox equivalent (TE)/L (non-treated liposomes) and 103.11±4.01 µmol TE/L (after UV irradiation). The IC50 value (the concentration of the sample required to scavenge 50% of free radicals) of non-treated liposomes with aloe waste extract was 59.77±1.08 µg/mL, while the IC50 for the UV-irradiated sample was 57.81±1.59 µg/mL. Thus, UV irradiation did not cause changes in the size and antioxidant capacity of aloe waste extract-loaded liposomes, while the mentioned treatment caused a significant increase in the PDI value. Since UV irradiation did not cause a decrease in the antioxidant activity of the sample, it can be concluded that the liposomal membrane effectively protects sensitive aloe waste antioxidants from UV degradation.





CONCLUSION

The study demonstrated that liposomes loaded with *Aloe vera* leaf waste extract maintained stable size and antioxidant activity after UV irradiation, despite an increase in PDI, confirming the protective role of the liposomal membrane against oxidative degradation.

FUTURE WORK / REFERENCES

Future research should explore optimization strategies to reduce polydispersity, improve formulation stability, and investigate the bioavailability and functional applications of these liposomes in food and cosmetic systems.

References: 10.3390/plants12142744, 10.1007/s11130-019-00747-5, 10.1021/jf034255i, and 10.3390/cosmetics8040106