Proceedings of the 8th World Congress on Electrical Engineering and Computer Systems and Sciences (EECSS'22)
Prague, Czech Republic - July 28- 30, 2022
Paper No. ICBES 135
DOI: 10.11159/icbes22.135

Study of Release and Anti-Inflammatory *in Vitro* Activity of Alginate Microspheres Loaded With Star Anise Essential Oil

Dulce L. Medina-Bueno[1], Ma. Victoria Domínguez-García[1], Jaime Flores-Estada[1] & Miriam V. Flores-Merino[1]
[1]Facultad de Química, Universidad Autónoma del Estado de México
Paseo Colón esq. Paseo Tollocán Residencial Colón y Col Ciprés, CP 50120, Toluca de Lerdo, Estado de México, Mexico
medinabno.dl@gmail.com; mvdominguezg@uaemex.mx; jflorese@uaemex.mx; mvfloresm@uaemex.mx

Extended Abstract

Star anise essential oil (SAO) is generally recognized as safe by the FDA for human health. Trans-anethole is among its most significant components which various bioactivities have been conferred, *i.e* anti-inflammatory activity. Some animal studies and cell lines suggest that trans-anethole may have beneficial effects in the treatment of chronic diseases related to inflammation, for example, inflammatory pain, and neurodegenerative disease, among others. However, SAO has several disadvantages, for example, it is sensitive to light and can be easily oxidized and poorly soluble in water, therefore its applications are limited. Hence, it is necessary a delivery system that preserve the therapeutic properties of SAO and allows its controlled release. On the other hand, the use of alginate spheres for the encapsulation and release of drugs has gained relevance due to water solubility, mechanical stability, biodegradability, and biocompatibility.

The aim of this work was to encapsulate star anise essential oil in alginate microspheres (Alg/SAO MS) by the ionic extrusion method. The physicochemical properties, the release kinetics and the *in vitro* anti-inflammatory activity, were evaluated. The encapsulation of SAO in the Alg microspheres was verified by FTIR analysis. Also, the encapsulation efficiency (EE%) and the load capacity (LC%) were determined.t. Additionally, the sphericity factor (SF) and the theoretical polydispersity were calculated. The release kinetics was performed for 96h to evaluate the feasibility of its use as an extended-release system. Finally, the *in vitro* anti-inflammatory activity of Alg/SAO MS was analyzed indirectly using the egg albumin denaturation method.

Keywords: anti-inflammatory activity, microspheres, essential oil, biomaterials, biomedical applications.

References

[1] A. C. Aprotosoaie, I. I. Costache, and A. Miron, "Anethole and its role in chronic diseases," *Adv. Exp. Med. Biol.*, vol. 929, pp. 247–267, 2016.
[2] L. I. Atanase, "Micellar drug delivery systems based on natural biopolymers," *Polymers (Basel).*, vol. 13, no. 3, pp. 1–33, 2021.
[3] A. Gonzalez-Pujana, G. Orive, J. L. Pedraz, E. Santos-Vizcaino, and R. M. Hernandez, *Alginate microcapsules for drug delivery*, vol. 11. 2018.
[4] M. Lengyel, N. Kállai-Szabó, V. Antal, A. J. Laki, and I. Antal, "Microparticles, microspheres, and microcapsules for advanced drug delivery," *Sci. Pharm.*, vol. 87, no. 3, 2019.
[5] N. T. T. Uyen, Z. A. A. Hamid, N. X. T. Tram, and N. Ahmad, "Fabrication of alginate microspheres for drug delivery: A review," *Int. J. Biol. Macromol.*, vol. 153, pp. 1035–1046, 2020.
[6] C. Y. Yu, J. F. Zhang, and T. Wang, "Star anise essential oil : chemical compounds, antifungal and antioxidant activities: a review," *J. Essent. Oil Res.*, vol. 33, no. 1, pp. 1–22, 2021.