ANTIBACTERIAL ACTIVITY OF NEROLIDOL IN FREE AND ENCAPSULATED FORMS IN ORANGE JUICE

Elissa Ephrem, Amal Najjar, Catherine Charcosset, Hélène Greige-Gerges

[1]*Bioactive Molecules Research Laboratory Faculty of Sciences (Lebanese University, Lebanon) Laboratoire d'Automatique et de Génie des Procédés (Université Claude Bernard Lyon I, France)*
[2]*Bioactive Molecules Research Laboratory, Faculty of Sciences (Lebanese University, Lebanon)*
[3]*Laboratoire d'Automatique et de Génie des Procédés (Université Claude Bernard Lyon I, France)*
[4]*Bioactive Molecules Research Laboratory, Faculty of Sciences (Lebanese University, Lebanon)*

Abstract

Fresh fruit juices are commonly susceptible to spoilage by acid-tolerant microorganisms among which lactobacilli, such as *Lactobacillus fermentum*. In this study, *L. fermentum* survival and growth in culture medium (MRS) and in fresh orange juice were challenged by the addition of a naturally occurring sesquiterpene alcohol, nerolidol. This compound is used as a food-flavoring agent. Its potent antibacterial activity had been demonstrated against several microorganisms. However, nerolidol is poorly soluble in water and photolabile, and is therefore unstable in aqueous media. To overcome this limitation, different formulations of nerolidol, in cyclodextrin (CD), drug-in-cyclodextrin-in liposome (DCL) and conventional liposome were considered. Free nerolidol, added with DMSO as a co-solvent at 0.5% in final culture, exhibited a strong antibacterial activity within 22 hours in MRS at 37°C , with low minimal inhibitory (25 μM) and bactericidal (50 μM) concentrations. However, under refrigerated conditions (4°C), nerolidol showed no bactericidal activity within 22 hours in MRS, even at 200 μM. In orange juice, stored at 4°C, nerolidol had only shown a total bactericidal activity when added at 2000 μM, after 96 hours of incubation. At this concentration, CD/Ner inclusion complex showed a total bactericidal activity after 168 hours. The delay in activity could be due to the slow release of nerolidol incorporated into the inclusion complex. Our preliminary results have also shown that nerolidol encapsulated in DCL and conventional liposomes exhibited no antibacterial activity for up to 20 days of incubation. This could be due to the strong retention of nerolidol within DCL and conventional liposome systems. Current studies are being conducted to optimize DCLs and liposome formulations to enhance the release of nerolidol in fruit juice.

Keywords— Encapsulation, *Lactobacillus fermentum*, nerolidol antibacterial activity, orange juice.

Professional Biography

Elissa EPHREM received her master's degree in "Bio-health: Bioactive molecules" from the Lebanese University in 2013, with a thesis focusing on the effective encapsulation of rosemary essential oil, which was conducted at Laboratoire d'Automatique et de Génie des Procédés at the University of Claude Bernard Lyon I, France. She is currently a third-year PhD student working on the encapsulation of antibacterial agents for fruit juice preservation. Her PhD project is being conducted in collaboration between the Bioactive Molecules Research Laboratory at the

Lebanese University and Laboratoire d'Automatique et de Génie des Procédés at the university of Claude Bernard Lyon I, France.



Email Id: Lisseph@yahoo.com
Phone number: 0096170752671