CARPATHIAN JOURNAL OF FOOD SCIENCE AND TECHNOLOGY

journal homepage: **http://chimie-biologie.ubm.ro/carpathian_journal/index.html**

POTENTIAL OF NISIN LOADED LIPID NANOPARTICLES ON INHIBITION OF *ENTEROBACTER CLOACAE* BIOFILM FORMATION

Suganthi Ramasamy[1]✉, Navitha Thanu J.S [2], Trisha Mary Pandipilly Antony[2], Sumathy Raj[2]

[1]Department of Biotechnology, Dr NGP Arts and Science College, Coimbatore, Tamil Nadu, INDIA

[2]Department of Biotechnology, Dr G R Damodaran College of Science, Coimbatore, Tamil Nadu, INDIA

✉*suganthir@drngpasc.ac.in*

https://doi.org/10.34302/crpjfst/2024.16.2.17

Article history:
Received: January 11th, 2024
Accepted: June 19th, 2024

Keywords:
Enterobacter cloacae;
Food borne pathogen;
Biofilm formation;
Nisin loaded liposomes;
Food grade nanoparticles;
Encapsulation efficiency.

ABSTRACT

The food borne pathogen *Enterobacter cloacae* contribute to food borne illness in humans. Biofilm formation in *Enterobacter cloacae* makes them more resistant to antibiotics. The main goal of the research is to prevent biofilm-forming *Enterobacter cloacae* by encapsulating nisin in liposomes using nanotechnology. The isolate was identified by 16S rRNA gene sequencing, and the biofilm-formed were characterized. Nisin was selected based on sensitivity testing. A microvesicle encapsulation method was used to encapsulate nisin in liposomes. Bacterial control was determined by colony forming units in an in vitro bioassay. Inhibition and eradication of *Enterobacter cloacae* was investigated using a microbial biofilm high-throughput antimicrobial susceptibility test using the Calgary biofilm apparatus. The food borne pathogen *Enterobacter cloaca was* isolated from the skin of grapes. After characterizing the biofilm formation on the isolate, the results showed that *Enterobacter cloacae* has the highest biofilm formation in tryptic broth (TSB) and brain heart infusion medium (BHI). In the antibiotic susceptibility test, the isolate is inhibited by antibiotics when presented in high concentrations. High-throughput analysis was performed using the Calgary biofilm apparatus, and the results showed that the nisin-loaded liposome exhibited good inhibition compared to antibiotics. One mM concentration of nisin (3.3 mg/10 mL) was used to encapsulate them in liposomes using a microvesicle encapsulation method. The results showed a tremendous inhibition of the food borne pathogen *Enterobacter cloacae* by the colony-forming units. This liposomal encapsulation of nisin promises high inhibition and can also be used for food safety.