

TITLE: ANTIBACTERIAL ACTIVITY OF RESVERATROL ENCAPSULATED INTO LIPOSOMES

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ABSTRACT:

Currently, the humanity faces serious challenges in treatment of hospital infections. Additionally, bacterial resistance is one of the most important public health problems that causes therapeutic failures. Thus, the scientific community joins efforts to find new therapeutic options for the treatment of infections. In this context, the natural products seems to be a source of potential drugs. Resveratrol (RES) is a polyphenolic compound found in dietary sources, mainly in the grapes film and in the skin of the peanut. This polyphenol has a variety of biological activities, such as antioxidant, anticancer and anti-inflammatory activities, but its low bioavailability, low solubility and high human toxicity limit its administration. Therefore, the liposomes could overcome the drawbacks of RES. Liposomes are vesicles formed by one or more lipid bilayers that isolate one or more internal aqueous compartments from the external environment. This nanocarrier can decrease drug toxicity and increase drug bioavailability. Thus, this study aimed to evaluate the antibacterial activity of pure resveratrol and resveratrol encapsulated into liposomes. Initially, the liposomes containing Resveratrol (RES_Lipo) were prepared by a method of thin lipid film followed by sonication as previously developed by our research group. RES_Lipo were characterized by by measuring the pH, particle size, polydispersion index (PDI), zeta potential and encapsulation efficiency (%EE). The antibacterial activity of RES and RES_Lipo against *Escherichia coli* ATCC 25922, *Klebsiella pneumoniae* ATCC 700603, *Pseudomonas aeruginosa* ATCC 27853, *Staphylococcus aureus* ATCC 29213 and methicilin-resistant *Staphylococcus aureus* ATCC 33591 was carried out to determine the Minimum Inhibitory Concentration (MIC) and the Minimum Bactericidal Concentration (MBC) by microdilution method according to the Clinical and Laboratory Standards Institute (CLSI). RES_Lipo exhibit pH of 7.4, particle size of 118.2 ± 3.7 nm, PDI of 0.344, zeta potential of $+ 28.8 \pm 1.3$ mV and %EE of 95.8 ± 1.72 %. RES and RES_Lipo presented bacteriostatic activity. RES and RES_Lipo exhibit antibacterial activity with MIC from 75 to 300 $\mu\text{g/ml}$. The liposomes preserve the antibacterial activity of RES. The result showed that the RES_Lipo has a antibacterial potential indicating that the RES encapsulated into liposomes could have the capacity to be a future therapeutic agent used in medical clinic.

Keywords: Resveratrol, Liposome, antimicrobial activity, bacterial resistance

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