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Antimicrobial activity of nanoemulsion on drug-resistant bacterial pathogens

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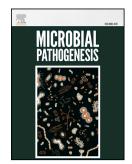
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7 ABSTRACT

The appearance of drug-resistant (DR) bacteria in the community is a crucial 8 development, and is associated with increased morbidity, mortality, healthcare costs, and 9 10 antibiotic use. Natural oil nanoemulsions (NEs) have potential for antimicrobial applications. In the present study, we determined the antimicrobial activity of an NE 11 against DR bacterial pathogens in vitro. The NE comprised Cleome viscosa essential oil, 12 13 Tween 80 nonionic surfactant, and water. We found that an NE with a droplet size of 7 nm and an oil:surfactant (v/v) ratio of 1:3 was effective against methicillin-resistant 14 Staphylococcus aureus (MRSA), DR Streptococcus pyogenes, and DR extended-15 spectrum beta-lactamase (ESBL)-producing Escherichia coli, Klebsiella pneumoniae, 16 and Pseudomonas aeruginosa. Fourier-transform infrared (FTIR) spectroscopy revealed 17 that NE treatment modified the functional groups of lipids, proteins, and nucleic acids in 18 DR bacterial cells. Scanning electron microscopy (SEM) showed damage to the cell 19 membranes and walls of NE-treated DR bacteria. These alterations were caused by 20 bioactive compounds with wide-spectrum enzyme-inhibiting activity in the NE, such as 21 22 β -sitosterol, demecolcine, campesterol, and heneicosyl formate. The results suggest that Download English Version:

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