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ABSTRACT TEMPLATE

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Characterization of bacterial cellulose-neem-hypericum oil wound care paste *in vitro* and in Galleria mellonella *in vivo* model

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The advancement of nanotechnologies has allowed the optimization of strategies for managing skin lesions with antibacterial and antibiofilm activity. This study aims to develop a biobased material as an innovative treatment for bacterial infections of wounds (1). This formulation is based on bacterial cellulose nanofibres obtained through a green fermentation process, combined with a mixture of neem and hypericum oils, already used in the cosmetic field. This formulation has been physico-chemical characterized and its biocompatibility has been assessed. *In vitro* tests highlighted that the bacterial cellulose-based paste has detachment capabilities of *Pseudomonas aeruginosa* and *Staphylococcus aureus* biofilms. The efficacy of the treatment was also evaluated *in vivo* using *Galleria mellonella* larvae as a burn wound infection model. The obtained results showed how the application of the paste determined an increase in the survival percentage of the injured and infected larvae, compared to untreated larvae.
The innovative aspect of this formulation is the biofilm-detachment action against two of the most common surgical wound pathogens, without the involvement of antimicrobial agents that could induce antibiotic resistance. The *in vivo* method used to determine the biocompatibility and efficacy of the paste represents an interesting opportunity to promote the use of *Galleria mellonella* larvae as a model for studies of nanotoxicity and infection of skin lesions. These results, supported by further future investigations, could lead to the development of a biobased formulation to be applied to damaged skin for the removal of colonizing pathogenic microorganisms.
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