Eco-conscious use of white grape pomace as a source of extracts with strong antibiotics potentiation effects against *Staphylococcus aureus* biofilms

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Abstract

Surgical site infections (SSIs) are common postoperative occurrences due to bacterial contamination, often linked to biofilm formation. Biofilm-associated SSIs are extremely recalcitrant to conventional antibiotherapy due to several tolerance mechanisms provided by the multidrug-resistant bacteria. Biofilm-forming bacteria survival and the emergence of new resistant bacterial infections pose a serious threat to the healthcare system. Moved by this serious situation and the urge for novel and alternative antimicrobial/antibiofilm strategies, the main goal of this study was to promote the valorization of winemaking industry residues like pomace as antibiotics adjuvants. For this purpose, aqueous and hydroethanolic white grape pomace extracts from SOGRAPE VINHOS S.A (Vila-Real) were obtained and tested for their antimicrobial and biofilm removal potential against *Staphylococcus aureus*, and the ability to enhance the activity of selected topical antibiotics. Firstly, the antimicrobial/antibiotic potentiation action of aqueous and hydroethanolic (50:50 v/v-ET50; 70:30 v/v-ET70) extracts was determined by microdilution and well diffusion methods, respectively. The extracts/extract-antibiotic combinations were analyzed on pre-established biofilms in terms of mass removal (BMR), metabolic activity reduction (BMAR), and cells´ culturability (log colony-forming units (CFU)/cm2 reduction). Interesting results were obtained for combinations that included the antibiotic oxacillin (OX; 0.5 µg/mL) and the hydroethanolic extracts (at 100 mg/mL), namely OX+ET50 (BMAR=71.5%) and OX+ET70 (BMAR=64.5%). In addition, both combinations of gentamicin (GE; 0.5 µg/mL) and OX with the hydroethanolic extracts resulted in total log CFU/cm2 reduction (4.78).

The overall results allowed to conclude that white grape pomace hydroethanolic extracts can be clinically projected to potentiate the activity of antibiotics (e.g. GE/OX), even suggesting the presence of higher bioactive compounds content.