CPPC 2021

sciforum

Abstract

Natural antimicrobial based hydrogel for hands and food contact surfaces disinfection

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† Presented at the First Canadian Peptide and Protein Community Virtual Symposium, 27–28 May 2021; Available online: https://cppc2021.sciforum.net/

Published: 27 May 2021

Abstract: There has been a long-felt need for sanitizer hydrogel, which has a high degree of antimicrobial efficacy while posing no toxicity and environmental incompatibility. This study aims to develop and characterize functional hydrogels from biocompatible and biodegradable natural ingredients, with broad antimicrobial activity against pathogenic and spoilage organisms. Four natural antimicrobial compounds, namely reuterin, pediocin, microcin J25, and lactic acid, were produced, purified, and their antimicrobial activity was evaluated (alone or in combination) using agar well diffusion and microtitration assays. The combined effect among these compounds was investigated by checkerboard assay based on predetermined MIC values against the indicator strains *S. Newport* ATCC 6962 and *L. ivanovii* HPB28. A consortium of microcin J25, reuterin, and lactic acid was selected due to its high synergistic interaction. Hydrogel formulas containing the selected consortium were developed from carbohydrate-based biopolymer chitosan and Charboxymethylcellulose (CMC). They were characterized in terms of viscosity, antimicrobial activity, and stability during storage at room temperature. Hydrogels made from chitosan (1.5% and 2.5%) and CMC (3% and 5%) were selected based on their required viscosity and inhibition activity against indicator strains. Both hydrogels were shown to remain stable and active during four-week storage at room temperature. This antimicrobial hydrogel formula represents therefore a promising and safer alternative to commercial chemical products for hands and food surface disinfection.