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PROSPECTS FOR THE USE OF LACTOBACILLI EXOPOLYSACCHARIDES AGAINST ANTIBIOTIC-RESISTANT OPPORTUNISTIC BACTERIA

The extreme conditions of the war in Ukraine and breaches of aseptic practice have increased the risk of wound infections with antibiotic-resistant strains. A comprehensive treatment approach (surgical debridement, combined antibiotic therapy, phage therapy, antiseptics, and reconstructive wound closure) is currently used. A promising strategy is the local application of enzymes and polysaccharides that can disrupt bacterial biofilms and the cell walls of pathogens. Exopolysaccharides (EPS) from lactic acid bacteria are attractive for medical use because they may accelerate tissue regeneration, modulate immune responses, and inhibit pathogenic microorganisms. The **aim** of the work was to study the antimicrobial activity of EPS produced by two lactobacilli strains from the Collection of Marine and Biotechnology-Useful Microorganisms (Odesa I.I. Mechnikov National University) against both clinical and reference strains of opportunistic bacteria. **Methods.** Quantitative determination of EPS was performed after the cultivation of *Lactobacillus casei* subsp. *casei* L187 OL18 and *L. casei* subsp. *tolerans* L290 OL29 in MRS broth with 5% D-sucrose at 24 °C. EPS in culture supernatants were quantified by the phenol-sulfuric acid assay. Antimicrobial activity of aqueous EPS solutions against reference and clinical strains of *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* was assessed by the agar-well diffusion method. Antimicrobial susceptibility testing of the clinical isolates (5 strains of *P. aeruginosa* and 3 strains of *K. pneumoniae*) was performed using the automated MicroScan Walk-Away system (USA). Experiments were performed in three independent replicates. **Results.** The *L. casei* strains L187 OL18 and L290 OL29 synthesized 107.5 ± 2.3 mg/mL and 95.6 ± 2.1 mg/mL of EPS, respectively. Clinical strains of *P. aeruginosa* and *K. pneumoniae* isolated from combat gunshot wounds were pan-resistant or had extremely low susceptibility to traditional antimicrobial drugs, including beta-lactamase inhibitors, which creates a critically dangerous situation. Clinical isolates of *P. aeruginosa* and *K. pneumoniae* from combat-related gunshot wounds were pan-resistant or exhibited extremely low susceptibility to conventional antibiotics, including β -lactamase inhibitors. Aqueous solutions of EPS produced by both *L. casei* strains at a concentration of 0.06 g/L inhibited the growth of collection and clinical strains of *P. aeruginosa* and *K. pneumoniae*. The zones of growth inhibition of the collection strains *P. aeruginosa* ATCC 27853 and *K. pneumoniae* ATCC 10031 were 10.7 ± 0.3 – 13.0 ± 0.4 mm when exposed to EPS from both lactobacilli strains. The 8 clinical strains studied were more resistant, with growth inhibition zones of 8.0 ± 0.6 – 9.2 ± 0.5 mm. The EPS synthesized by the *L. casei* L290 strain demonstrates consistently higher antimicrobial activity than the EPS of *L. casei* L187 against all tested bacterial groups. **Conclusions.** The bacteriostatic effect of EPS produced by the *L. casei* strains L187 and L290 makes them promising for the creation of local antimicrobial agents. It is advisable to proceed studying the mechanisms of EPS action and their application as a component of combination drugs for the treatment of infected wounds.

Keywords: exopolysaccharides, lactobacilli, antibiotic resistance, opportunistic bacteria.

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