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COMPREHENSIVE EVALUATION OF NOVEL *K. PNEUMONIAE* BACTERIOPHAGES FOR AEROSOL DELIVERY APPLICATIONS

Background/Aim. The global rise of multidrug-resistant *Klebsiella pneumoniae* is a major challenge to healthcare systems, driving research into phage therapy as an alternative treatment. This study characterizes 9 novel bacteriophages, assessing their genomic safety, host range, and stability during jet nebulization. **Methods.** Phages were isolated from sewage samples by the overlay agar method, followed by characterization based on whole-genome sequencing. Phage titer stability was evaluated after jet nebulization to assess suitability for aerosol delivery. **Results.** The isolated phages differ in plaque morphology, host range, and genomic characteristics. Belonging to 8 distinct genera, all phages were confirmed as strictly lytic, lacking lysogeny-related genes, virulence factors, and antibiotic resistance genes. The host range varied from 2% to 42%, with Myovirus-like phages exhibiting the broadest spectrum. Virion stability during jet nebulization correlated with morphology. Siphovirus-like phages demonstrated infectious titer reductions of 0.67 and 1.03 log₁₀ PFU/mL, whereas a Myovirus-like phage showed a minimal decrease of 0.36 log₁₀ PFU/mL. All tested phages maintained the titers sufficient for therapeutic application, confirming suitability for inhalation delivery. **Conclusions.** The isolated phages possess diverse genomic characteristics and collectively lyse 57 out of 96 tested clinical bacterial strains, demonstrating a broad host range. All isolates maintained the therapeutically effective titers during nebulization. This stability and the absence of known antibiotic resistance genes, virulence determinants, and lysogeny-related factors validate their applicability for inhalation therapy. Urban sewage is a rich source of phages against prevalent *Klebsiella* strains, highlighting the value of environmental surveillance for developing local therapeutic phage panels as a strategy against antimicrobial resistance. **Grants/Fundings.** This research was conducted as part of the bilateral Ukrainian-Latvian research project "Complete genome sequencing and analysis of bacteriophages isolated in Ukraine as a crucial step towards realizing their therapeutic potential" (Grant ID LV_UA/2025/5 & LV_UA/2026/5, Latvian Council of Science; 0125U003007, Ministry of Education and Science of Ukraine).

Keywords: *Klebsiella*, bacteriophages, nebulizer, phage therapy.

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