

Abstract

The increasing prevalence of carbapenem-resistant Escherichia coli has highlighted the need for alternative antibacterial strategies. This study aimed to isolate and characterize environmental bacteriophages active against carbapenem-resistant E. coli using wastewater samples collected from various locations in Bangkok, Thailand. Using carbapenem-resistant E. coli clinical isolates obtained from King Chulalongkorn Memorial Hospital as host bacteria, a total of 28 bacteriophages were successfully isolated and propagated, yielding titers ranging from 3.6×10^4 to 1.22×10^{13} PFU/mL. Host range analysis against 52 E. coli isolates revealed varying infectivity profiles, with phage 003/5 exhibiting the broadest host range (42.31%), followed by phages 003/2 (36.54%) and 055/3 (28.85%). Six phages demonstrating the broadest host ranges were further characterized through pH, temperature, and chloroform stability assays. Overall, the selected phages remained stable across pH 4–12 and temperatures ranging from 4°C to 60°C. Chloroform treatment produced variable responses among the tested phages, with most phages maintaining infectivity across the tested concentrations, while phage 104/5 exhibited a marked reduction in titer at higher chloroform concentrations. These findings demonstrate that tropical wastewater environments in Thailand serve as valuable reservoirs of diverse bacteriophages with activity against carbapenem-resistant E. coli. The isolated phages exhibited promising host range and stability characteristics, supporting their potential for further investigation as candidates for phage-based antibacterial applications.

Keywords: Bacteriophage, Carbapenem-resistant E.coli, Wastewater, Host range, Phage stability.