

Effect of detergents as antibacterial agents on biofilm of antibiotics-resistant *Vibrio parahaemolyticus* isolates

ABSTRACT

Vibrio parahaemolyticus (*V. parahaemolyticus*) is a halophilic, Gram-negative human pathogen known as a leading cause of seafood-derived food poisoning. Due to high contamination rate of seafood in Asian countries, *V. parahaemolyticus* is considered as a food safety concern. *V. parahaemolyticus* is able to produce biofilm which is more resistant toward disinfectants and antibodies than its planktonic form. Thirty six *V. parahaemolyticus* isolates from seafood were tested for their susceptibility using 18 different antibiotics. Two *V. parahaemolyticus* isolates were resistant to bacitracin, chloramphenicol, rifampin, ampicillin, vancomycin, nalidixic acid, penicillin and spectinomycin. Fourteen *V. parahaemolyticus* isolates were found to be resistant to bacitracin, tetracycline, rifampin, ampicillin, vancomycin, penicillin and spectinomycin. The remaining two isolates were resistant to more than 2 antibiotics. Majority of the *V. parahaemolyticus* isolates (97.2%) showed MAR index > 0.2 , indicating that these isolates were originated from high risk sources. To investigate effect of three common detergents on antibacterial-resistant *V. parahaemolyticus*, 16 *V. parahaemolyticus* isolates resistant to more than 7 antibiotics were selected. *V. parahaemolyticus* (ATCC 17802) was used as reference strain. Detergents were tested for their minimum inhibitory concentration (MIC) and minimal bactericidal concentration (MBC) and time-kill curves were constructed to assess the concentration between MIC and bactericidal activity of detergents. Detergents D1 (Linear alkyl benzene based) was found to be the most effective with MIC and MBC ranged between 97.656 and 1562.5 $\mu\text{g/ml}$ and 781.25–3125 $\mu\text{g/ml}$, respectively. The time-kill curves demonstrated that the bactericidal endpoint for resistant *V. parahaemolyticus* isolates reached after 30 min incubation with D1 at concentration $8 \times \text{MIC}$. The isolate VP003 was killed at $8 \times \text{MIC}$ within 0.5 h and the reduction in CFU/ml was 3 log units (99.9%). *V. parahaemolyticus* biofilms were formed in 96 wells microtiter plates at 37 °C and 24 h-old biofilm were used to test antibacterial activity of detergents. Results showed that biofilm-producing ability of antibacterial-resistant *V. parahaemolyticus* isolates were inhibited at 1562.5–6250 $\mu\text{g/ml}$ of D1 and eradicated at 3125 – $\geq 50,000$ $\mu\text{g/ml}$ of D1. Detergents showed potential antimicrobial activity against *V. parahaemolyticus*.

Keyword: Antibacterial; *Vibrio parahaemolyticus*; Seafood; Biofilm