

**Title** Combining basic electrolyzed water pretreatment and mild heat greatly enhanced the efficacy of acidic electrolyzed water against *Vibrio parahaemolyticus* on shrimp

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#### Abstract

The objective of this study was to investigate the efficacy of acidic electrolyzed water (AEW) against *Vibrio parahaemolyticus* on shrimp. The shrimp was initially inoculated with *V. parahaemolyticus* (7–8 log CFU/g), and treated with AEW (AEW1 containing 51 mg/L of chlorine or AEW2 containing 78 mg/L of chlorine) or organic acids (2% AA and 2% LA) for 1 min or 5 min under different treated conditions. The effect of AEW was better than that of organic acids, the number of survival *V. parahaemolyticus* cells on shrimp was reduced by 0.9 log CFU/g after treatment for 5 min with AEW without vibration, while 1.0 log CFU/g bacteria cells reduced with vibration. No significant difference ( $p > 0.05$ ) was observed between AEW and organic acids in the bactericidal activity with or without vibration. The effective order of temperatures on bactericidal activities of AEW was  $50\text{ }^{\circ}\text{C} > 20\text{ }^{\circ}\text{C} > 4\text{ }^{\circ}\text{C}$ , and a 3.1 log CFU/g reduction of *V. parahaemolyticus* cells on shrimp was detected with treatment of AEW at  $50\text{ }^{\circ}\text{C}$ . Mild heat greatly enhanced efficacy of electrolyzed water against *V. parahaemolyticus*. Basic electrolyzed water (BEW) ( $50\text{ }^{\circ}\text{C}$ ) pretreatment combined with AEW ( $50\text{ }^{\circ}\text{C}$ ) treatment remarkably reduced bacterial cells by 5.4 log CFU/g on shrimp after treatment for 5 min. There was a significant change in physicochemical properties (pH, ORP, ACC) of AEW, after it was used to wash shrimp ( $P < 0.05$ ). This study suggests that BEW ( $50\text{ }^{\circ}\text{C}$ ) pretreatment followed by AEW ( $50\text{ }^{\circ}\text{C}$ ) treatment could be a possible method to effectively control *V. parahaemolyticus* contamination on shrimp.