Physicochemical properties and bactericidal activities of acidic electrolyzed water used or stored at different temperatures on shrimp

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Abstract

The objective of this study was to evaluate physicochemical properties and bactericidal activities of acidic electrolyzed water (AEW) used or stored at different temperatures on shrimp. Three independent experiments were carried out. The first experiment was to evaluate the physicochemical properties and bactericidal activities of AEW used at three different temperatures (4, 20, 50 °C) against food-borne pathogens (Listeria monocytogenes and Vibrio parahaemolyticus) contamination on cooked shrimp at 1 or 5 min; the second one was to monitor the bactericidal activity of AEW used at two temperatures (20, 50 °C) against total aerobic bacteria on raw shrimp at 5 min by conventional plate count method and PCR–DGGE method; the last one was to examine the physicochemical properties and bactericidal activities of AEW (AEW1, AEW2) stored at two temperatures (−18, 25 °C) for 30 d against total aerobic bacteria on raw shrimp at 2 min. Results showed that AEW used at 50 °C showed the best bactericidal activity, leading to a log reduction of 3.11 for V. parahaemolyticus, 1.96 for L. monocytogenes and 1.44 for total aerobic bacteria at 5 min, respectively. Conventional plate count and PCR–DGGE (denaturing gradient gel electrophoresis) study further suggested that the bactericidal activity of AEW used at 50 °C was higher than at 20 °C. The loss of bactericidal activity of AEW stored at −18 °C was less than that of stored at 25 °C, and the ORP and ACC decreased more slowly than those of stored at 25 °C. However, the ORP and ACC of AEW used at 50 °C showed a remarkably faster decrease than that of used at 20 °C. We suggest using AEW at 50 °C to enhance bactericidal activity and storing at −18 °C to keep the content of ACC and the bactericidal activity.

Highlights

► AEW used at 50 °C showed the best bactericidal activity. ► The ORP and ACC of AEW used at 50 °C showed a remarkably decrease. ► AEW stored at −18 °C was better than that of stored at 25 °C.
Keywords
AEW; Temperature; Shrimp; Vibrio parahaemolyticus; Listeria monocytogenes; Total aerobic bacteria; DGGE