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Development of Sterilization Method Using Electrolyzed Water Produced from Sodium Chloride for Various Foods

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Summary

In recent years, food safety and security concerns have increased, and appropriate measures for hygiene have been required. Although laboratory-level sterilization methods have been studied, there are few reports of suitable methods for each food. Therefore, we examined that sterilization method using electrolyzed water (EW) produced from sodium chloride for various foods.

Test solutions include sterile water (control), acidic electrolyzed water (AEW; <pH 2.7, 20 ppm), slightly acidic electrolyzed water (SAEW; pH 6.0, 30 ppm), neutral electrolyzed water (NEW; pH 8.0, 40 ppm) and a solution of sodium hypochlorite (NaClO; pH 8.0, 40 ppm) was used. *Staphylococcus aureus* C-29, *Salmonella* Enteritidis NBRC3313 and *Escherichia coli* ATCC 10798 were used as test strains. The bactericidal effect of each test solution was examined in the presence of an organic substance (bovine serum albumin; BSA). In the presence of 5% BSA, NEW maintained its bactericidal effect. When the optimal immersion times of the test solution (100 mL) were examined using 10 g of chicken breast meat, the bacterial number decreased by 1.0 log CFU/g after three times. Because there was no difference between three and four times, it was considered that the optimum immersion times was three. When the optimal immersion times of the test solution (100 mL) was examined using 10 g of chicken breast meat, the bacterial number decreased by 1.0 log CFU/g. In addition, the influence of electrolyzed water on the expression of pathogenic factors of food poisoning bacteria was evaluated. As a result, NEW significantly suppressed the expression of pathogenic agents of food poisoning bacteria. Furthermore, the quality (color difference, pH, degree of lipid oxidation and free amino acid content) in meat after electrolyzed water treatment and the safety (mutagenicity) of the treatment solution were evaluated. As a result, quality deterioration of the foodstuff after the NEW process was not recognized. In addition, no mutagenicity was observed in NEW after treatment. These results suggest that the sterilization method using NEW can be applied to various foodstuffs.