Shelf-life of pacific white shrimp (*Litopenaeus vannamei*) as affected by weakly acidic electrolyzed water ice-glazing and modified atmosphere packaging

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Highlights

- Effect of WAEW ice-glazing and MAP on quality of shrimp is investigated.
- Combined treatment maintains a low TVBN, TMA, and TBARS in shrimp.
- Combined treatment displays superior inhibitory activity against microorganisms.
- Combined treatment has no negative effect on cooked shrimp.
- Combined treatment shows synergistic antibacterial and preservation effects.

Abstract

The combined effect of weakly acidic electrolyzed water (WAEW) ice-glazing and modified atmosphere packaging (MAP) treatment on the quality of pacific white shrimp (*Litopenaeus vannamei*) during frozen storage was investigated in terms of microbiological activity, TVBN, TMA and TBARS content, texture, color and volatile flavor analysis. As a result, significantly ($p < 0.05$) higher inhibitor effects on total aerobes and *Staphylococcus aureus* were observed in WAEW ice-glazed shrimp packaged in 40% CO$_2$ + 10% O$_2$ + 50% N$_2$ or in 30% CO$_2$ + 20% O$_2$ + 50% N$_2$ than the water- and WAEW ice-glazed batches. Additionally, chemical analysis results showed that WAEW ice-glazing combined with MAP was highly effective in maintaining lower TVBN, TMA and TBARS values in frozen shrimp, perhaps due to...
the synergistic effect of antibacterial and antioxidant abilities. On the other hand, the texture, $L^*$, and $a^*$ results also confirmed that this combined treatment effectively retarded the degradation of the physical structure of shrimp muscle and showed a positive effect on the stability of color during frozen storage. However, the presence of WAEW ice-glaze showed a negative effect on the volatile flavor of thawed shrimp due to the volatile chlorine and chlorine dioxide, but no significant effect in the cooked samples. Overall, the application of WAEW ice-glazing combined with MAP on peeled frozen shrimp is advisable to achieve better quality maintenance and extend the shelf-life of refrigerated products.

Keywords
Shrimp (*Litopenaeus vannamei*); Weakly acidic electrolyzed water (WAEW); Ice glazing; Modified atmosphere packaging (MAP); Frozen storage