Inhibition of *Campylobacter jejuni* on fresh chicken breasts by κ-carrageenan/chitosan-based coatings containing allyl isothiocyanate or deodorized oriental mustard extract

Abstract

*Campylobacter* species are common bacterial pathogens associated with human gastroenteritis worldwide. The objectives of this study were to determine the minimum inhibitory (MIC) and minimum bactericidal (MBC) concentrations of allyl isothiocyanate (AITC) against 4 *Campylobacter jejuni* strains in Mueller–Hinton (MH) broth at 4, 21, 37 and 42 °C and to screen the *C. jejuni* strains for their ability to degrade sinigrin (which forms AITC) in pH 7.0 MH broth at 35 °C for 21 d. Also evaluated was the antimicrobial activity of an edible 0.2% κ-carrageenan/2% chitosan-based coating containing AITC or deodorized oriental mustard extract against a 4 strain *C. jejuni* cocktail (6.2 log<sub>10</sub> CFU/g) on vacuum-packaged fresh chicken breasts during 4 °C storage. MIC values of AITC were 0.63 to 1.25 ppm and 2.5 to 5 ppm against tested strains at 37 and 42 °C, respectively. However, the MBC was 2.5 and 5 ppm at 37 and 42 °C, respectively, and increased to a range of 40 to 160 ppm at 4 °C. κ-Carrageenan/chitosan-based coatings containing 50 or 100 μl/g AITC reduced viable *C. jejuni* to undetectable levels on chicken breast after 5 d at 4 °C, while 25 μl/g AITC or 200 to 300 mg/g mustard extract in coatings reduced *C. jejuni* numbers by 1.75 to 2.78 log<sub>10</sub> CFU/g more than control coatings without antimicrobial. Both oriental mustard extract (50 to 300 mg/g) and AITC (≥ 25 μl/g) reduced aerobic bacteria by 1.72 to 2.75 log<sub>10</sub> CFU/g and lactic acid bacteria (LAB) by 0.94 to 3.36 log<sub>10</sub> CFU/g by 21 d compared to the control coating. κ-Carrageenan/chitosan coatings containing ≥ 50 μl/g AITC or ≥ 300 mg/g oriental mustard showed excellent potential to control *C. jejuni* viability on raw chicken.