

Title Effects of drying methods and conditions on antimicrobial activity of edible chitosan films enriched with galangal extract

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Abstract

The aim of this work was to study the effects of drying methods and conditions (i.e., ambient drying, hot air drying at 40 °C, vacuum drying and low-pressure superheated steam drying within the temperature range of 70–90 °C at an absolute pressure of 10 kPa) as well as the concentration of galangal extract on the antimicrobial activity of edible chitosan films against *Staphylococcus aureus*. Galangal extract was added to the film forming solution as a natural antimicrobial agent in the concentration range of 0.3–0.9 g/100 g. Fourier transform infrared (FTIR) spectra and swelling of the films were also evaluated to investigate interaction between chitosan and the galangal extract. The antimicrobial activity of the films was evaluated by the disc diffusion and viable cell count method, while the morphology of bacteria treated with the antimicrobial films was observed via transmission electron microscopy (TEM). The antimicrobial activity, swelling and functional group interaction of the antimicrobial films were found to be affected by the drying methods and conditions as well as the concentration of the galangal extract. The electron microscopic observations revealed that cell wall and cell membrane of *S. aureus* treated by the antimicrobial films were significantly damaged.