Abstract

Microbial activity is a primary cause of deterioration in many foods and is often responsible for reduced quality and safety. Food-borne illnesses associated with E. coli O157:H7, S. aureus, S. enteritidis and L.monocytogenes are a major public health concern throughout the world. A number of methods have been employed to control or prevent the growth of these microorganisms in food. Antimicrobial packaging is one of the most promising active packaging systems for effectively retarding the growth of food spoilage and pathogenic microorganisms. The aims of this research were to develope and study the physical, mechanical, physic-chemical properties and inhibitory effects of properties edible gelatin film incorporated with catechin-lysozyme for use as active packaging for food. For antimicrobial packaging development, we found that catechin-lysozyme showed the highest antimicrobial activity against in all microbial testing. Cathechine can inhabit *E. coli* and *S. aureus* at the minimum inhibitory concentration (MIC) of 640 μg/ml and the minimum bactericidal concentration (MBC) values was 640 and 1,280 μg/ml, respectively. For lysozyme, we obtained that it can inhibit *L. innocua* at the MIC and MBC values of 160 and 640 μg/ml, respectively and *S. cerevisiae at* MIC and MBC were lowest at the same level of 2.5 μg/ml. The result from determination of the mechanical, physic-chemical properties and inhibitory effects of the fish gelatin films against selected food spoilage microorganisms when incorporated with catechin-lysozyme conclude that the effect of the catechin-lysozyme combination addition (CLC: 0, 0.125, 0.25, and 0.5%, w/v) on fish gelatin film properties was monitored. At the level of 0.5% addition, the CLC showed the greatest elongation at break (EAB) at 143.17% with 0.039 mm thickness, and the lowest water vapor permeability (WVP) at 6.5 x 10−8 g·mm·h-1·cm-2·Pa-1, whereas the control showed high tensile strength (TS) and the highest WVP. Regarding color attributes, the gelatin film without CLC addition gave the highest lightness (L* 91.95) but lowest in redness (a*-1.29) and yellowness (b*2.25) values. The light transmission of the film did not significantly decrease and nor did film transparency ($p>0.05$) with increased CLC. Incorporating CLC could not affect the film microstructure. The solubility of the gelatin based film incorporated with CLC was not affected, especially at a high level of addition ($p>0.05$). Inhibitory activity of the fish gelatin film against E.coli, S.aureus, L. innocua and S. cerevisiae was concentration dependent. These findings suggested that CLC incorporation can improve mechanical, physico-chemical, and antimicrobial properties of the resulting films, thus allowing the films to become more applicable in active food packaging.

Keywords: Antimicrobial, Biodegradable packaging, Catechin, Gelatin film, Lysozyme