Effect of Cinnamaldehyde on survival of *E. coli* O\textsubscript{157}:H\textsubscript{7} in minced meat by using PMA- real time PCR

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Abstract

The antimicrobial effect of cinnamaldehyde on *Escherichia coli* O\textsubscript{157}:H\textsubscript{7} in ground beef was investigated by inoculation of *Escherichia coli* O\textsubscript{157}:H\textsubscript{7} into ground beef at 6 logs CFU/g, followed by addition of cinnamaldehyde (0% v/v, 0.3% v/v and 0.6% v/v). The inoculated ground beef was stored at 4°C for 14 days, *Escherichia coli* O\textsubscript{157}:H\textsubscript{7} count was determined by both culturing on Sorbitol Mackonkey agar (SMAC) and propidium Monoazide (PMA) real time PCR on days 0, 3, 5, 7 and 14. Cinnamaldehyde reduced the pathogen count by 3 log CFU/g in 14 days at 0.6% v/v and by 2.5 log CFU/g in 14 days at 0.3%. There were no significant differences between measuring of *Escherichia coli* O\textsubscript{157}:H\textsubscript{7} count by both SMAC and PMA real time PCR. Cytotoxicity of Cinnamaldehyde were evaluated on BHK-21 cell line. Cinnamaldehyde can be best employed in the fight against *Escherichia coli* O\textsubscript{157}:H\textsubscript{7} in meat products without causing any hazards to the consumer.

Introduction:-

*Escherichia coli* O\textsubscript{157}:H\textsubscript{7} is one of the most notorious food-borne pathogens, with an infectious dose as low as a few hundred cells (Karmali, 2004). Beef and dairy products, juices and fresh produce are foods that are often associated with *E. coli* O\textsubscript{157}:H\textsubscript{7} outbreaks. *E. coli* O\textsubscript{157}:H\textsubscript{7} infections can lead to nonspecific diarrhea, hemorrhagic colitis and even hemolytic uremic syndrome (HUS) (Banatvala et al., 2001). Majority of *E. coli* O\textsubscript{157}:H\textsubscript{7} outbreaks have been associated with the consumption of undercooked ground beef and raw milk (Armstrong et al., 1996; Hancock et al., 1997 and Mao et al., 2001). Plant-derived essential oils represent a group of natural antimicrobials that have been traditionally used to preserve foods as well as enhance food flavor. Cinnamaldehyde is an aldehyde present as a major component of bark extract of cinnamon (Cinnamomum verum) (Holley and Patel, 2005). Cinnamaldehyde is classified as a GRAS (generally regarded as safe) molecule by the United States Food and Drug Administration and is approved for use in foods (21 CFR 182.60) (Adams et al., 2004). Although Cinnamaldehyde has been reported to possess an antimicrobial property against food-borne pathogens (Bilgrami et al., 1992; Burt, 2004; Holley and Patel, 2005), its use for improving the safety of ground beef needs to be validated. The involvement of *E. coli* O157:H7 with the consumption of ground beef and beef products...