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PRESERVATION EFFECT OF ELECTROLYZED WATER AND ESSENTIAL OIL COMPOUNDS IN REFRIGERATED TUNA PATTIES

BY

Abou-Taleb, M.
Laboratory of Fish Processing and Technology, National Institute of Oceanography and Fisheries, 101 El-Kasr El-Eini, Cairo, Egypt

ABSTRACT

Tuna (*Thunnus obesus*) meat was treated with anodic electrolyzed NaCl solution EW(+) and addition of 0.5% [0.25% carvacrol (C) + 0.25% thymol (T)] as well as its effect on the preservation of pattie during storage at 5°C was evaluated. Addition of 0.5% (C+T) and combined treatment of EW(+) and 0.5% (C+T) kept volatile basic nitrogen of patties at lower level and also significantly repressed an increase in peroxides and thiobarbituric acid-reactive substances during storage. Combined treatment of EW(+) and 0.5% (C+T) gave the strongest overall inhibition of microbial growth in patties during storage. There were significant differences between control pattie and other treated patties in taste, flavour and overall acceptability.

Key words: Electrolyzed water, antimicrobial; antioxidant, carvacrol, thymol, tuna, fish pattie, shelf life

Corresponding author. Tel. : +20222016717; fax: +20242185320.
E-mail address: m_abou_taleb@yahoo.com (M. Abou-Taleb).

INTRODUCTION

Seafood products have attracted considerable attention as a source of high amounts of important nutritional components to the human diet (Ackman, 1989). Burgers and meatballs are very common and well-liked products in almost every country today. Chicken and fish burger patties or balls also became widespread around the world, especially in Turkey. Various methods are used to manufacture ready-made products from mince, such as burger patties (Kose *et al.*, 2006). On the other hand, Akkus *et al.* (2004) showed that the shelf life of the fish balls prepared from boiled and raw anchovy was 9 days at 4±1°C. Metin *et al.* (2002) found that trout burgers wrapped in gas barrier film had a shelf life of 21 days under cold storage.

Electrolyzed oxidizing water has generated much interest as a disinfectant in the food industry (Venkitanarayanan *et al.*, 1999; Park *et al.*, 2002). The electrolyzed oxidizing water is prepared through the electrolysis of a NaCl solution in the anode side of an instrument in which the anode and cathode are separated by an ion-permeable membrane, and so also named as EW(+). EW(+) is characterized by a low pH ranging from 2.3 to 2.7 and high oxidation-reduction potential (ORP) ranging from +1050 to +1100 mV, and has been reported to have strong bactericidal effects against many Gram-positive and Gram-negative pathogenic bacteria, such as *Escherichia coli* O157:H7 (Kim *et al.*, 2000; Venkitanarayanan *et al.*, 1999), *Listeria monocytogenes* (Kim *et al.*, 2003; Venkitanarayanan *et al.*, 1999), *Bacillus cereus* (Buck *et al.*, 2002), and *Salmonella* species (Fabrizio *et al.*, 2002; Venkitanarayanan *et al.*, 1999). In addition, it could disinfect hepatitis B virus and human immunodeficiency virus (Morita *et al.*, 2000) and reduce germinations of many fungal species (Buck *et al.*, 2002).