

MICROBIAL AND CHEMICAL QUALITY OF RETAILED SAUSAGE AND ANTIMICROBIAL EFFECT OF ESSENTIAL OILS OR LACTIC ACID BACTERIA AGAINST FOODBORNE PATHOGENS

ABSTRACT

Forty five of retailed sausage samples (including fresh, frozen and fermented sausage) were collected from local and central markets of Qalubia, Cairo and Giza Governorates and analyzed for some microbial groups enumeration, pathogens detection and chemical characteristics. Data showed that, all sausage types contained coliform microorganisms where frozen sausage had coliform counts over the permissible limits followed by fresh and fermented sausage. On the other hand, fermented sausage had the highest records of lactic acid bacteria, proteolytic and lipolytic bacteria. All samples were positive for presence of *Staph. aureus* especially fresh sausage which recorded the highest mean counts. *Listeria monocytogenes*, *E. coli* O157:H7 and *Salmonella spp.* were also presented at higher percentage in fresh sausage followed by frozen and fermented ones. Concerning chemical analysis, frozen sausage had the highest values of sodium nitrite and total volatile nitrogen while, the highest mean values of thiobarbaturic acid was observed in fermented one. Furthermore, antimicrobial activity of eight essential oils of spices and two strains of lactic acid bacteria against four strains of foodborne pathogens isolated and identified from the previous three types of sausage was studied. Maximum mean values of inhibition zones of spices against the tested pathogens were obtained by marjoram followed by cumin and mint essential oils. In addition, all tested pathogens were inhibited by either *Lactococcus lactis* or *Lactobacillus plantarum* and their mixture which gave the highest mean values of inhibition zones.

Key words: Sausage, coliform bacteria, *Staph. aureus*, *E.coli* O157:H7, *Salmonella sp.*, *L. monocytogenes*, sodium nitrite, spices, lactic acid bacteria.

INTRODUCTON

The need for hygienic meat products has gained importance due to awareness among consumers about health risks associated with contaminated meat. Microbiological quality of either spoilage or food poisoning microorganisms in sausage depends on the meat used for mincing, sanitary conditions and practices in preparation time and temperature of storage (Mantis *et al.*, 2005). These factors may cause a major risk for subsequent foodborne infection in human (Reid *et al.*, 2002). Many foodborne diseases are associated with sausage consumption that attributed to the presence of pathogenic bacteria such as *Staph. aureus*, *Listeria monocytogenes*, *E.coli* O157:H7 and *Salmonella sp.* which makes sausage had human health hazard. In this respect, Indu *et al.* (2006) mentioned that there are more than 1.3 billion cases of human salmonellosis annually, with three million deaths. Also, enterohemorrhagic *E.coli* O157:H7 is implicated in large number of foodborne outbreaks in many parts of the world including developed countries. Moreover, *Listeria monocytogenes* has been isolated from various environments and is reported to cause 25% of all the deaths resulting from foodborne outbreaks in the United States annually. Recent investigations concentrated on finding out means to eliminate the pathogenic bacteria naturally contaminate meat and meat products (Rafael and Martinis, 2005). Many