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Antimicrobial activity of essential oils from mediterranean aromatic plants against several foodborne and spoilage bacteria

Nuno Silva¹, Sofia Alves^{1,2}, Alexandre Gonçalves^{1,2,3,4},
Joana S. Amaral^{5,6} and Patrícia Poeta^{1,2}

Abstract

The antimicrobial activity of essential oils extracted from a variety of aromatic plants, often used in the Portuguese gastronomy was studied in vitro by the agar diffusion method. The essential oils of thyme, oregano, rosemary, verbena, basil, peppermint, pennyroyal and mint were tested against Gram-positive (*Listeria monocytogenes*, *Clostridium perfringens*, *Bacillus cereus*, *Staphylococcus aureus*, *Enterococcus faecium*, *Enterococcus faecalis*, and *Staphylococcus epidermidis*) and Gram-negative strains (*Salmonella enterica*, *Escherichia coli*, and *Pseudomonas aeruginosa*). For most essential oils examined, *S. aureus*, was the most susceptible bacteria, while *P. aeruginosa* showed, in general, least susceptibility. Among the eight essential oils evaluated, thyme, oregano and pennyroyal oils showed the greatest antimicrobial activity, followed by rosemary, peppermint and verbena, while basil and mint showed the weakest antimicrobial activity. Most of the essential oils considered in this study exhibited a significant inhibitory effect. Thyme oil showed a promising inhibitory activity even at low concentration, thus revealing its potential as a natural preservative in food products against several causal agents of foodborne diseases and food spoilage. In general, the results demonstrate that, besides flavoring the food, the use of aromatic herbs in gastronomy can also contribute to a bacteriostatic effect against pathogens.

Keywords

Antimicrobial activity, aromatic plants, essential oils, foodborne bacteria, food spoilage bacteria

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INTRODUCTION

Microbial pathogens are a major cause of a significant number of foodborne illnesses worldwide. In the United States, it has been estimated that known pathogens considered as foodborne agents annually can cause 9.4 million illness cases (Scallan et al., 2011). Data collected by the Center for Disease Control (CDC) through the Foodborne Disease Outbreak Surveillance System, revealed that in 2008, a total of 1034 foodborne disease outbreaks were reported, which resulted in 23,152 cases of illness, 1276 hospitalizations

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