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Extended Abstract

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Antibacterial activity of the essential oils extracted from cassia bark, bay fruits, and cloves against Vibrio parahaemolyticus and Listeria spp

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Spices are added into foods mainly for enhancing the organoleptic quality of the food. The application of spices and their derivatives in foods as preservatives has been investigated for years. In this study, we determined the antibacterial activity of the essential oils of three spices, cassia bark (bark of Cinnamomum aromaticum Nees), bay (Laurusnobilis L) fruits and cloves (Syzygium aromaticum), against Vibrio parahaemolyticus, Listeria monocytogenes, and four Listeria species. The chemical composition of these essential oils was analysed by the GC-MS method. The results showed that all of the oils had potent inhibitory effects against all of the tested bacteria. The essential oil from cassia bark exhibited the greatest antimicrobial activity, while the oil from bay fruits had the lowest activity against the bacteria. The main active compounds in the essential oils from cassia bark, bay fruits and cloves were identified to be cinnamaldehyde (78.11%), cinnamaldehyde (61.78%) and eugenol (75.23%), respectively. The antimicrobial activity and the chemical composition of Cinnamomum aromaticum Nees bark and Laurusnobilis L fruits essential oils are reported for the first time. This in-vitro study demonstrated the antimicrobial activity of the spices, indicating the spice extracts are potential sources of antimicrobial agents for using in food products. Microbial pathogens in food may cause spoilage and contribute to foodborne disease incidence, and the emergence of multidrug resistant and disinfectant resistant bacteria—such as Staphylococcus aureus (S. aureus), Escherichia coli (E. coli), and Pseudomonas aeruginosa (P. aeruginosa)—has increased rapidly, causing the increase of morbidity and mortality. Weak acids such as benzoic and sorbic acids, which are commonly applied in food industry as chemical preservatives to increase the safety and stability of manufactured foods on its whole shelf-life by controlling pathogenic and spoilage food-related microorganisms, can result in the development of microbiological resistance. Moreover, chemical preservatives cannot completely eliminate several pathogenic bacteria like Listeria monocytogenes (L. monocytogenes) in food products or delay the growth of spoilage microorganisms. Natural products, as substitutes of synthetic chemical preservatives, are increasingly accepted because they are innately better tolerated in human body and have inherent superiorities for food industry. The antimicrobial activities of natural products are necessary to be studied and applied in food industry. Morbidity and mortality are mainly caused by infectious diseases all over the world. The World Health Organization reported that 55 million people died worldwide in 2011, with one-third of the deaths owing to infectious diseases. Antibiotic resistant microorganisms can increase mortality rates because they can survive and recover through their ability to acquire and transmit resistance after exposure to antibiotic drugs, which are one of the therapies to infectious diseases. Antibiotic resistant bacteria threaten the antibiotic effectiveness and limit the therapeutic options even for common infections. The decline in research and development of new antibacterial agents, which are able to inhibit antibiotic resistant disease-causing microorganisms such as S. aureus, aggravates the emerging antibiotic resistance. Therefore, much attention should be paid to natural products, which could be used as effective drugs to treat human diseases, with high efficacy against pathogens and negligible side effects. Spices have been used as food and flavoring since ancient times, and as medicine and food preservatives in recent decades. Many spices—such as clove, oregano, thyme, cinnamon, and cumin—have been applied to treat infectious diseases or protect food because they were experimentally proved to possess antimicrobial activities against pathogenic and spoilage fungi and bacteria. Moreover, the secondary metabolites of these spices are known as antimicrobial agents, the majority of which are generally recognized as safe materials for food with insignificant adverse effects. Therefore, spices could be candidates to discover and develop new antimicrobial agents against foodborne and human pathogens. This review summarizes the scientific studies on the antibacterial and antifungal activities of spices and their derivatives, and some suggestions and prospects are offered for future studies.

Bottom Note: *This work is partly presented at Joint Event on Biotechnology, Biochemistry and Aquaculture* August 08-09, 2019 | Paris, France