Effects of Antimicrobial Culinary Spices on E. coli and C. butyricum

Samanta, Jade (School: Saxony Lutheran High School)

According to a 2017 report from the World Health Organization, over 600 million people worldwide contract an illness caused by a foodborne pathogen, and about 420,000 of these individuals die from a foodborne disease. Mortality rates are especially high in developing countries, where sanitation and food handling are not thoroughly regulated. Yet, many cultures have developed natural methods of effectively sanitizing food by using spices in preparation and cooking. Though spices have been used in alternative medicine of various cultures since ancient times, only in recent decades have scientists been able to observe their activity in the deterioration of bacterial cell membranes. Research in this area is warranted because of the increasing ineffectiveness of traditional antibiotics due to bacterial resistance. The purpose of this study was to test the antimicrobial performance of four varieties of household culinary spice extracts (in the form of essential oils): turmeric essential oil, thyme essential oil, cinnamon essential oil, and clove essential oil, on gram-positive (Clostridium butyricum) and gram-negative (Escherichia coli) bacteria samples. These species were chosen because E. coli is one of the primary causes of gastrointestinal foodborne illnesses and some Clostridium strains can cause botulism. Antimicrobial effects of the three spices were measured by using a common microbial bioassay technique, measuring zone of inhibition in Petri dishes. The data shows that Essential Oils derived from spices indeed possess antimicrobial properties against bacteria, even at relatively small concentrations. The abilities of these spices to inhibit bacterial growth can be practical with regard to food preparation in areas where foodborne illnesses are prevalent.

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