Commentary

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Investigation of Antimicrobial Activity of Some Currently Available Topical Antimicrobial Products

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Description

The purpose of this study was to improve the so-called agar overlay assay so that it could be used to examine the antimicrobial activity of some of the topical antibiotics that are currently on the market against a variety of Gram positive and Gram negative bacteria. Various assay parameters, such as the placement of products into wells or onto coverslips, overlay agar concentration, base agar volume, and inoculum concentration, were taken into consideration during the optimization process. Commercial semi-solid over-the-counter products i.e. non-prescription medicines for topical application used frequently without supervision by a healthcare professional containing a variety of active pharmaceutical ingredients were evaluated using the optimized assay, which was found to be a convenient, suitable, and effective platform. It was also found to be potentially applicable to complex natural product-based formulations. In contrast to other tests, which require products to be dissolved or diluted, compromising their integrity, the optimized method's capacity to determine the antimicrobial activity of intact products without further manipulation was the most encouraging feature.

Controlling Spoilage and Pathogenic Microorganisms

Antimicrobial substances that come from plants are secondary metabolites that plants make and use to protect themselves. These secondary metabolites are utilized in a variety of food and medical applications. As components of human medications, plant antimicrobial substances have received a lot of attention from scientists controlling spoilage and pathogenic microorganisms that cause food-borne infections and intoxications is also of interest. The current state of antimicrobial resistance in the food chain, which poses a significant threat to public health. Many communities have traditionally used herbs and spices to treat a variety of ailments, including as antimicrobial agents. Herbs and spices are generally regarded as safer for humans than conventional antibiotics because of their long-standing use in food preparation. It has been reported that a number of spices and herbs have antimicrobial properties. For instance, research has shown that extracts of cinnamon stick, oregano, clove, grape seed, and pomegranate peel have antibacterial properties against pathogens that can be spread through food, with Gram-positive bacteria being more susceptible than Gram-negative bacteria. E. coli was the most resistant, while S. aureus was the most sensitive. The phenolic content of the extracts was strongly correlated with their antibacterial activity. Ginger (Zingiber officinale) belongs to the Zingiberaceae family. It is used as a spice and medicinal plant all over the tropical regions of Asia, Africa, America, and Australia. Studies on the diversity of ginger have shown that the key bioactive compounds in cultivated ginger are significantly influenced by environmental factors and that rhizomes and vegetative character vary. Garlic, on the other hand Allium sativum is a bulbous perennial plant in the Alliaceae family. There are basically two main types of garlic the hard neck and the soft neck. Hard neck garlics have central hard, woody stalks that go all the way down to the bulb's basal plate. The pseudo stem of soft necked garlic is made of overlapping leaf sheaths and is not woody. Unless the plant is stressed by the environment, it rarely produces a flower stalk. The hard-necked garlic is thought to have evolved into the soft-necked garlic. The hard neck, soft neck, and genetic variation of garlic are described in detail.

Nano-Sized Carrier and Other Properties

During the time that food is stored, it is very important to keep pathogenic microorganisms from contaminating it. Due to the sensitivity and volatility of bioactive compounds, the essential oils do not have the full potential to be utilized as antimicrobial agents. Using the freeze-drying method, the purpose of this study was to characterize Thymus vulgaris essential oil, both free and nano-encapsulated in alginate-whey protein concentrate carriers. The oil's composition was identified through GC/MS analysis. Using the micro dilution method, Escherichia coli, Staphylococcus aureus, and Candida albicans were used to investigate the antimicrobial effects of free and encapsulated oil. The free thyme oil had an antimicrobial activity of 0.71–1.43 mg/ml against all of the microorganisms tested. Interestingly encapsulated oil with an encapsulation efficiency of 86.04% was more effective at lower concentrations thanks to a nano-sized carrier and other properties. When compared to free oil, TGA noted that encapsulation had a significant impact on the stability of thyme

oil at temperatures ranging from 25 to 500 °C. The findings suggested that thyme oil powder carriers have a lot of potential as natural food additives with antimicrobial properties. The main components of essential oils, terpene-based substances, are the subject of extensive research into their antimicrobial properties. Additionally, it has been reported that some of the hydrocarbons that make up antimicrobial substances have antimicrobial activity. The antimicrobial activity of isoprene and its mechanism were investigated in this study, which confirmed that Rhodobacter sphaeroides produces isoprene, the most fundamental constituent hydrocarbon of terpenes. To assess the impact of volatile isoprene, we developed an air-sharing culture system in which various bacterial cultures shared the same aseptic atmosphere. Two Gram-negative and two Gram-positive bacteria were used to test the effects. Consequently, R. sphaeroides isoprene had antimicrobial activity against all tested strains, particularly Gram-positive bacteria more so than Gram-negative bacteria. FE-SEM was also used to look at the bacteria's microstructure. The FE-SEM images demonstrated that isoprene's antimicrobial activity mechanism acts on the cell wall or extracellular membrane to kill cells. Thymus zygis or red thyme is a widespread plant in this genus that is widely used as a culinary flavoring agent. The Thymus genus has been used in traditional medicine and as a food spice for centuries. Bioactive properties like antimicrobial, insecticidal, larvicidal, and antiphrastic effects have been demonstrated by its essential oil. This essential oil has been the subject of numerous studies, which demonstrate that it has a broad antimicrobial spectrum and may even enhance the effectiveness of some antimicrobial agents. Its antimicrobial activity against food spoilage and pathogenic microorganisms has been examined on various matrixes, pointing to its potential use as a food preservative. The chemical composition, antimicrobial, insecticidal, larvicidal, and antiparasitic properties, toxicity, and potential use as a food preservative of T. zygis essential oil are all examined in this review.