Microbial Effects of Chemically Modified Oils

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Abstract:

The exploration of essential oils has dramatically increased over the most recent years. Although essential oils have been mainly used for olfactory purposes, recent investigations have explored their potential biological effects as well. With the rise of multi-drug resistant bacteria, many researchers are looking to find other natural methods that are able to fight bacterial infections (*1*). In some instances, specific oils have been shown to produce higher antimicrobial activity than some antibiotics used today, such as penicillin and ampicillin (*2*). If the individual chemical components of the essential oils that contain these antimicrobial effects are identified in an efficient manner, specific types of the oils can then be expertly chosen (rather than randomly chosen) to treat bacterial diseases (*3*). In addition, if the oils were chemically modified in a way that enhanced their antimicrobial properties, the results would prove to have a great impact in both developed and developing nations around the world.

Whereas research on essential oils has been reported, limited research has been conducted on chemically modified essential oils. The project comprises three major purposes: 1. chemical modification of several essential oils; 2. testing of the modified essential oils for inhibition of bacteria; 3. isolation and identification of individual compounds that exhibit anti-bacterial activity.

Twelve essential oils and oil components were selected for this project. After antimicrobial properties of oils and components against *Escherichia coli* and *Staphylococcus aureus* were assessed through the disk-diffusion method, the oils and components most effective at inhibiting bacterial growth were selected for selective chemical modification. Afterwards, oils and components were again tested against the same bacterial strains via the disk diffusion method. The results indicated a significant increase in their antimicrobial effects from the first disk diffusion test. Currently, we are in the process of performing thin-layer chromatography (TLC) and gas-chromatography-mass spectrometry (GC-MS) of oils in their normal and modified states. Future work for this project involves further chemical modifications and column fractionations to discover the individual components responsible for giving the oil its antimicrobial properties.