Testing the Antibacterial Effectiveness of Yunnan Baiyao, Propolis, Turmeric, and Tea Tree Oil on the Growth of Escherichia coli (E. coli) and Bacillus subtilis in Comparison to Antibiotics on an Agar Plate

Kinley, Vanessa (School: Bonita Springs High School)

One of the world's greatest human health crises is antibiotic resistance. With this problem at hand, and a slim chance of discovering a new class of antibiotics, microbiologists have adjusted to new methods of overcoming antibiotic resistance, making the research of natural antibacterial products crucial. Of these products, do turmeric powder, propolis extract, yunnan baiyao powder, and tea tree oil, have any antibacterial properties against gram-positive bacteria (Bacillus subtilis) and gram-negative bacteria (Escherichia coli)? If tea tree oil, turmeric, yunnan baiyao, and propolis are added on Bacillus subtilis, the bacteria will be susceptible to all agents and develop a visible zone of inhibition because gram-positive bacteria have a single layer of peptidoglycan, making it easier to penetrate. With the same procedure taken for Escherichia coli, the bacteria will show resistance because gram-negative bacteria have a more complex cell wall structure with outer membrane layers, making it harder to penetrate. To measure, both bacteria are evenly smeared onto agar plates, in which the natural antibiotics are then placed and incubated. The Kirby-Bauer method determines the susceptibility of bacteria to antimicrobials by measuring the zone of inhibition for each product placed. After 96 hours of incubation, Bacillus subtilis was susceptible to propolis, tea tree oil, and turmeric, exhibiting a clear zone of inhibition. Escherichia coli was only susceptible to tea tree oil. This indicates that tea tree oil has broad-spectrum antimicrobial effects, turmeric powder and propolis are effective against gram-positive bacteria, and yunnan baiyao does not show any signs of antimicrobial effectiveness.

Awards Won: