



CALIFORNIA SCIENCE & ENGINEERING FAIR 2019 PROJECT SUMMARY

Name(s) Miguel Velasquez	Project Number J1613
Project Title The Antibacterial Effects of Natural Remedies Compared to Antibiotics, Part 2	
<p style="text-align: center;">Abstract</p> <p>Objectives The objective of this experiment is to study if natural remedies such as ginger, silver, thyme oil and zinc commonly used for illness possessed antibacterial properties compared to antibiotics when tested against two common bacteria: Staphylococcus epidermidis (Staph epi.) and Escherichia coli (E. coli).</p> <p>Methods Agar fill petri dishes were inoculated with either E. coli or Staph epi. Control groups consisted of petri dishes with no antibiotic discs, blank discs, penicillin discs, and neomycin discs for each bacterial group. Test groups consisted of blank antibiotic discs saturated with either ginger juice, colloidal silver, ionized zinc, or thyme oil and placed in their perspective pre-labeled petri dishes (two petri dishes per group with 4 discs per dish). Petri dishes were incubated for 48 hours at 26.7 degrees Celsius (80 degrees Fahrenheit). The zone of inhibition was then measured in millimeters for each control and test groups.</p> <p>Results The petri dishes with no antibiotic discs and blank antibiotic discs not saturated with any test subject demonstrated no zone of inhibition. The penicillin group had an average of zero millimeters for the E.coli group in both Trial 1 and 2, while the penicillin had an average inhibition zone of 8.75 and 6.13 for the Staph epi bacterial group in each trial respectively. Ginger had a zone of inhibition of 0 mm for both Staph epi and E. coli groups in both trials. Colloidal silver showed an average inhibition zone of 2.13 (Trial 1) and 7.25 (Trial 2) for Staph epi group compared to the E. coli group demonstrating an inhibition zone of 1.38 (Trial 1) and 2.0 (Trial 2). Thyme oil group had zones of inhibition greater the 20mm in both E.coli and Staph epi. group for both trials. Zinc demonstrated an average zone of inhibition of 7.38 for trial 1 and 7.75 in trial 2 for the E. coli group. In the Staph. epi group, the inhibition zone in Trial 1 and Trial 2 was 13.88 and 13.63 respectively.</p> <p>Conclusions The hypothesis that zinc would demonstrate the most antibacterial effects was incorrect. Zinc did not have the largest zone of Inhibition but did demonstrate moderate antibacterial effects. The subject that demonstrated the most antibacterial effects was thyme oil (thymol). The thyme oil group demonstrated no bacterial growth in both the first and second trial for both bacterial groups, proving more effective than Penicillin and Neomycin control groups. This is important in that we can look at alternative sources to develop new antibiotics to fight increasing bacterial resistance. We can possibly use natural remedies to fight simple infections as opposed to inappropriately using antibiotics.</p>	
Summary Statement In measuring the average zones of inhibition of the studied natural remedies, I was able to determine that thyme oil had significant antibacterial effects against both E. coli and Staph. epi bacteria.	
Help Received I designed the study myself. My mother taught me how to inoculate petri dishes with the bacteria.	