CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)

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Project Number

36508

Project Title

How to Kill Bacteria: Natural Herbs vs. Antibiotics

Abstract

Objectives/Goals

Antibiotics are commonly used to treat common human bacterial infections. Overuse of antibiotics disturbs human bacterial flora and causes emergence of bacterial resistance. Our goal was to find out a safer and cheaper alternative to kill bacteria found in and around our kitchen area. Therefore, we hypothesized whether natural herbs- turmeric, ginger, or cinnamon inhibit bacteria as effectively as antibiotics (abx), such as trimethoprim/sulfamethoxazole(TMP) or ampicillin (AMP).

Methods/Materials

This study was performed in a major pathology laboratory under supervision of an MD pathologist. Bacterial samples were collected in blood agar plates (total #30) from kitchen disposal can. Five petri dishes were used to evaluate antibacterial activity of each agent; two antibiotics (TMP & AMP) and three natural herbs (turmeric, ginger & cinnamon). Five petri dishes were used as control (no abx or herb). Freshly prepared and carefully weighed amounts of each herbs mixed in sterilized water were placed in the center of bacteria laden plates. The petri dishes were finally incubated at 37 degrees Celsius for 24 hours in the laboratory refrigerator. The antibacterial activities were calculated in each plate by measuring inhibition zone (IZ) in millimeters at 3 points around each agent. The mean IZ of each agent was finally calculated across all 5 samples.

Results

The mean, Inhibition Zone, calculated from five samples of each agent were as follow: AMP 3.7 mm, TMP 2.7 mm, turmeric 1.3 mm, ginger 2.6 mm and cinnamon 5.5 mm respectively.

Conclusions/Discussion

Among three herbs we used, cinnamon demonstrated the best bacterial killing activity as compared to common antibiotics, TMP and AMP. Antimicrobial properties of cinnamon perhaps come from its three basic ingredients- cinnamaldehyde, cinnamyl acetate, and cinnamyl alcohol.

Our results are consistent with and support many prior studies that used herbs. However, the amount of each herbs used and the nature/type of bacterial growth are important variables that can influence our results.

In summary, the common natural herbs have incredible prospective be used to treat common bacterial infections. Given several challenges with the use of commercial antibiotics (adverse effects, emergence of resistance and cost), we must utilize anti-bacterial potential of our natural herbs as safer and cheaper alternatives.

Summary Statement

We hypothesized and proved through our experiment that natural herbs have potential to kill bacteria as compared to commonly used antibiotics.

Help Received

We came up with the hypothesis/question and details of procedures. Our mentor, Dr. David Slater (at UCSF Fresno MEP) provided laboratory space; material used in the project and assisted us in fine-tuning the methodology. We personally performed data analysis, conclusions and wrote the abstract.

Preliminary