

# Effectiveness of Home Remedies on E. Coli Growth

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## Introduction

The purpose of this experiment was to test the effectiveness of home remedies on e-coli bacteria. The home remedies we decided to use were garlic and ginger root. Garlic has been proven to have antibacterial properties. This is because when garlic is crushed, allicin is created through enzyme catalysis from the damaged garlic tissues (Reider et al 2020). Allicin is what can be used to effectively treat bacteria. Allicin inhibits DNA and protein synthesis as well as inhibits RNA synthesis as its main way to target bacteria (T et al 2018). Ginger has also been proven to have anti-inflammatory effects. Ginger is rich in antioxidants and it can be used to neutralize free radicals and prevent oxidative stress (Rahmani et al 2017). Ampicillin is broadly used to treat e-coli infections. We evaluated the effectiveness of crushed garlic root, crushed ginger root, and 10mg ampicillin on e-coli bacteria through the length of non-bacteria growth around treated disks. We predicted that between the home remedies, the garlic would have the greatest effect on preventing e-coli bacteria growth. But overall, ampicillin would have the greatest effect in preventing e-coli bacteria growth.

## Materials and Methods

Gather ginger, garlic, 10mg Ampicillin liquid to use for the treatment of the sensitivity disks. Peel skin from garlic, then use a knife to dice into small pieces. Using a mortar and pestle, smash ginger root until there is enough liquid to dip three blank sensitivity discs completely. Do the same with garlic. Dip the sensitivity disks in each liquid until it's soaked. Prepare the ampicillin sensitivity disk by dipping the disk in the liquid ampicillin. To prepare the agar plates, write on the bottom of each of the three plates the different types of treatment being used on the agar plate. One area labeled clear, garlic, ginger, and ampicillin. Then begin by gathering three e-coli culture tubes, three sets of glass beads, and a pipette with three different glass pipette tubes. Draw 1 mL of e-coli into the pipette and dispense it into the first agar plate. To disperse the e-coli evenly, place the glass beads and swirl around the agar plate until thoroughly covered. Repeat this step for each of the three agar plates. Dispose of the glass beads by dumping them into the 10% bleach solution. Once the three agar plates are fully covered in e-coli, it is time to start placing the treated sensitivity disks. Use a sterilized tweezer to place the sensitivity disk (either garlic, amp, or ginger). Place each of the treated sensitivity disks in their respective spots on the agar plate using their own specified tweezers. After the plates are prepped, tape the sides and incubate for 1 week at 21.3 Celsius.

## Results

When observing the sensitivity disks that include solutions of Ampicillin, Ginger, Garlic, and one left untreated, Ampicillin and Garlic portrayed the most noticeable results. Throughout all three trials, Garlic expressed an effect on E. coli as there are small rings around each disk treated with Garlic. Ampicillin expressed the best results, including a double ring structure in Figure 3. Although there is an unidentified bacteria that grew on top of E. coli in this disk, Ampicillin had the most noticeable effect on the bacteria.

Figure 1: Results of the amount of E-Coli Growth on Plate 1 after one week of incubation

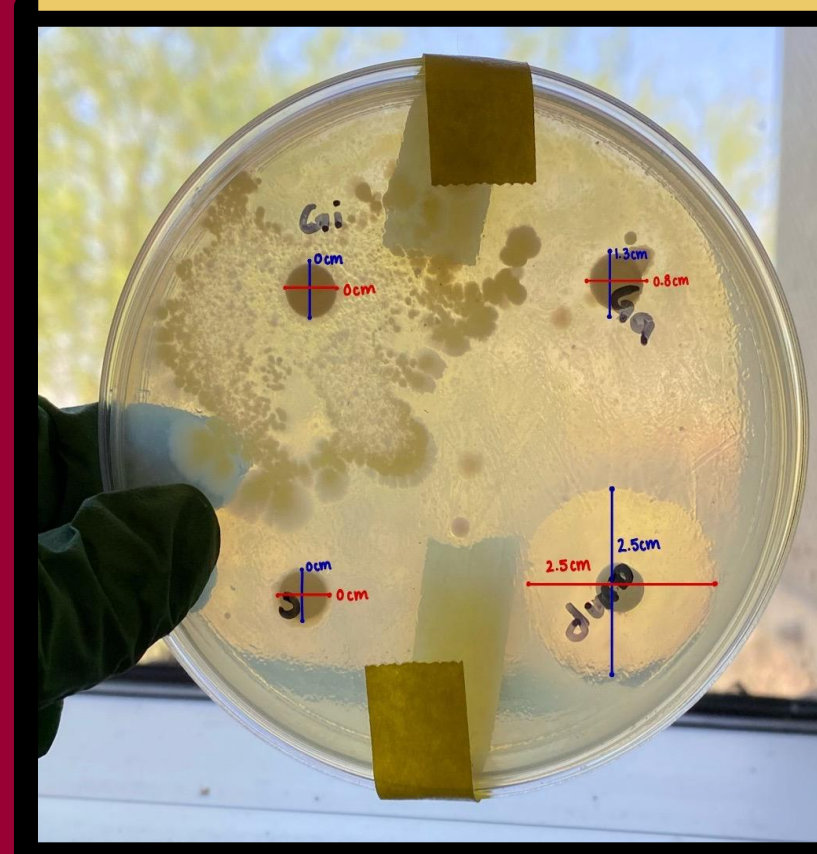


Figure 2: Results of the amount of E-Coli Growth on Plate 2 after one week of incubation



Figure 3: Results of the amount of E-Coli Growth on Plate 3 after one week of incubation

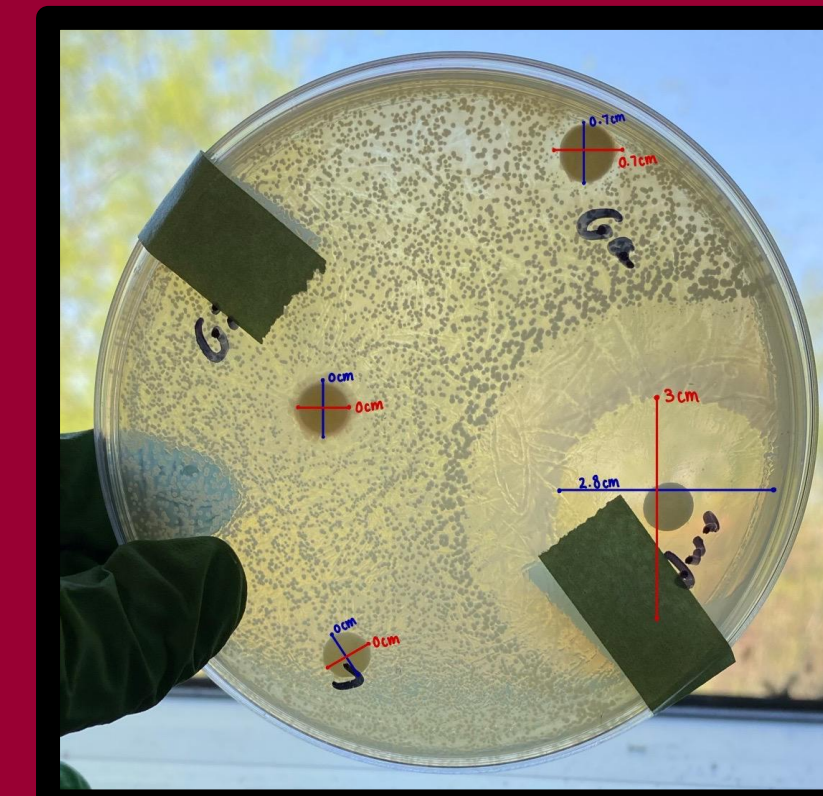


Figure 4: t-Test values

t-Test: Two-Sample Assuming Equal Variances

	Variable 1	Variable 2
Mean	5.762204525	0.7382742736
Variance	1.32008015	0.2637034926
Observations	3	3
Pooled Variance	0.7918918215	
Hypothesized Mean Difference	0	
df	4	
t Stat	6.914428691	
P(T<=t) one-tail	0.001147729333	
t Critical one-tail	2.131846782	
P(T<=t) two-tail	0.002295458666	
t Critical two-tail	2.776445098	

A t-test was used to determine the significant means between home remedies like garlic and E. Coli samples. Our test concluded a one tail P-value of 0.001 and a two tail P-value of 0.002 therefore the null hypothesis is rejected.

## Conclusion

From this experiment, it can be concluded that garlic had the greatest effect in treating the e-coli bacteria among the home remedies. Ampicillin had the greatest effect on the e-coli bacteria as we predicted. But this data is significant and proves that garlic does have antibacterial properties. From our t-test, we had a t-value of 2.13. This means that we reject the null hypothesis. In order to further solidify this observation, more trials would have to be done. Garlic did not have as large of prevention in growth as the ampicillin but this may be because there needed to be more treatments done on the garlic and ginger sensitivity disks, perhaps re-treatment once a day by adding a drop of freshly crushed ginger and fresh crushed garlic to each sensitivity disk. This would increase the intensity of the allicin in the garlic and perhaps bolster the antibacterial effect of the garlic on the e-coli bacteria. Overall, our results supported the hypothesis that garlic has antibacterial properties and in turn has an effect on the growth of e-coli bacteria.

## Literature Cited and Acknowledgements

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