DETERMINING THE MOST EFFECTIVE ANTIBIOTIC ON *Echerichia coli* DH5α

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INTRODUCTION

Antibiotics are only effective in fighting bacterial infections but not infections caused by a virus. Antibiotics work by killing bacteria, but there is a great variety of them and their mechanism of action is effective only on a specific group of bacteria. The doctor is the one who determines the diagnosis and guarantees us the selection of the appropriate antibiotic.

Bacteria are living organisms and are able to adapt to the environment. This capacity has allowed many of them to develop resistance mechanisms to some antibiotics, which reduces their effectiveness.

In this project we are going to determine the efficacy of some commonly used antibiotics, easily and visually by performing an antibiogram. In this way, we will help raise awareness among IES Fidiana students that not all antibiotics work the same and that self-medication and unwise use of these have the consequence of not been active against infections and prolong their healing time. This project will also allow a more precise medical prescription.

OBJECTIVES

Compare the efficacy of certain antibiotics for a more appropriate medical prescription.

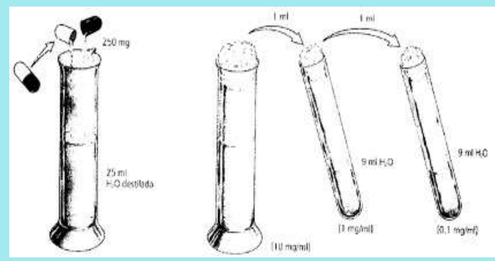
We are going to check the efficacy of the antibiotics cloxacillin, azithromycin, streptomycin and ampicillin in the *Echerichia coli* bacteria by studying the halo of inhibition of bacterial growth produced by each of the types of antibiotics.

MATERIALS AND METHODS

-Bacteria culture
-12 agar plates
-Parafilm to seal plates
-Antibiotics: anaclosil, azithromycin, streptomycin and ampicillin
-Pipette
-Test tubes
-Sowing handle / Buds
- 0.5 cm diameter filter paper circles

STEPS:
1. Make a homemade dilution of cloxacillin and azithromycin. (*)
2. Spread bacteria on the plates and spread them over the entire surface with the seeding loop or swabs.
3. Cut out circles of 1 cm radius.
4. Spread the diluted antibiotics on them with the help of the pipette and place them with a certain distance between them on the seeded plates.
5. Seal the plates and wait about a week.
6. Measure the diameters of the inhibition halos for each antibiotic.
7. Compare the results in a table / graph and draw conclusions.

*

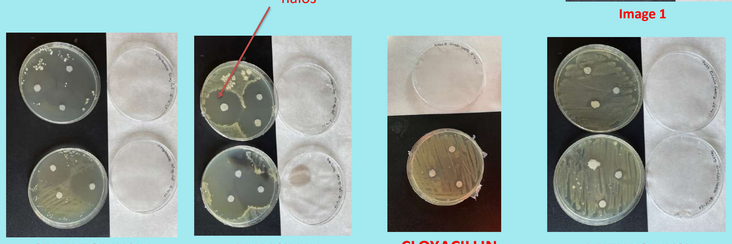


RESULTS

In all bacteria-seeded plates, inhibition halos have been formed around the antibiotics. We have compared them with the control plates (Image 1), to observe their differences:

1. Streptomycin (Image 2)
2. Ampicillin (Image 3)
3. Cloxacillin (Image 4)
4. Azithromycin (Image 5)

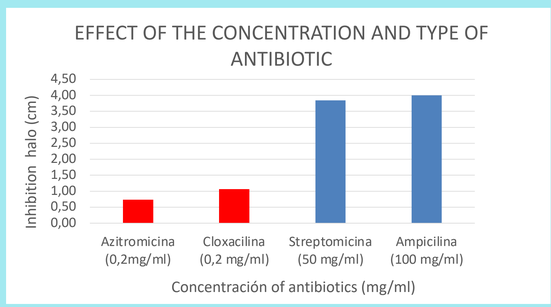
Image 1



STREPTOMYCIN Image 2 | AMPICILLIN Image 3 | CLOXACILLIN Image 4 | AZITHROMYCIN Image 5

ANTIBIOTICS	CONCENTRATION	INHIBITION HALOS
Azithromycin	0,2 mg/ml	0,73 cm
Cloxacillin	0,2 mg/ml	1,06 cm
Streptomycin	50 mg/ml	3,84 cm
Ampicillin	100 mg/ml	4 cm

Chart 1: Diameter of inhibition halos



Graph 2: Inhibition halos produced by antibiotics. Antibiotics used at low concentrations in red; those tested at higher concentrations in blue.

The antibiotics that were used at lower concentrations, azithromycin and cloxacillin, presented much lower inhibition halos while the antibiotics that were used at higher concentrations such as streptomycin and ampicillin (50 mg/ml and 100 mg/ml). This indicates a proportional relationship between the concentration and the inhibition halo. The higher the concentration of antibiotics the greater the diameter of the halo. On the other hand, comparing the two antibiotics used at low concentrations, it is observed that cloaxacillin is much more effective than azithromycin, since at the same concentration, cloxacillin produces a halo of inhibition 40% greater than that of azithromycin. . Regarding the antibiotics tested at higher concentrations, clearly streptomycin was more effective, since being at half the concentration of ampicillin, it generated an inhibition halo not significantly different from that generated by ampicillin. That is, lower concentrations of streptomycin have the same bactericidal effect as ampicillin.

CONCLUSIONS

1.- The inhibition halo completely demonstrates how effective each antibiotic is.
2.- Not all antibiotics have the same efficacy. Cloxacillin is more effective than azithromycin and streptomycin is more effective than ampicillin
3.- Smaller concentrations of antibiotics produce smaller inhibition halos.
4.- We must be very meticulous and careful with our work, so as not to confuse the antibiotic samples or the specified amounts that may lead to experimental errors.

FINAL CONCLUSION

In general, all antibiotics adequately perform their function against bacteria, eliminating these microorganisms that can be harmful to health of living beings. However, we observed that the action of streptomycin and cloxacillin is very effective, so they would kill these bacteria more quickly, ending any disease caused by their action as soon as possible.

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