

Abstract

This research project was created in order to find which over-the-counter medication would be most effective to inhibit the growth of yeast. We tested four creams to see which would work best. Our hypothesis was that miconazole cream would work the best while clotrimazole would work the least. Our hypothesis was half supported because the miconazole cream worked the best but the clotrimazole was the second best rather than the worst. This topic is important because it can help people find a solution to yeast infections without getting a prescription cream and is a cost efficient solution.

Introduction

It is well known that prescribed medications are costly, and creams for yeast infections are no exception. We wanted to answer the question of how different OTC antifungal creams for vaginal yeast infection affect the zone of inhibition for yeast. Our hypothesis was that miconazole would have the largest zone of inhibition and clotrimazole would have the smallest zone. Antifungal creams work by forming artificial holes in the yeast which then cause it to die. They stop the manufacture of ergosterol, which is an important material in yeast cell walls (Dany Baby, 2023). We then chose the creams in our hypothesis from an experiment done by a class in the summer of 2024. In their experiment on natural remedies, the miconazole cream did much better than the clotrimazole.

Methods

Materials & Location

We used 60 sterile discs, 15 YPD plates, 3 5-gram packets of wine yeast, Alcohol Prep Pads, Sterile beads, Miconazole Nitrate 1% Cream, Terbinafine Hydrochloride 1% Cream, Tolnaftate 1% Cream, Clotrimazole 1% Cream and deionized water. All experiments were carried out in the Kulshan Lab 110 at Whatcom Community College.

Procedure

We used the Kirby Bauer method to test our hypothesis: First, we created a yeast suspension by mixing 5g of yeast to a beaker of 50 mL of distilled water. Next, we divided all Agar plates into 4 quadrants, one quadrant for each treatment, then labeled them 1-4. Next, we pipetted 200 μ L of yeast suspension onto each agar plate. To evenly distribute the yeast, we added about 10 sterile glass beads in each plate then swirled them around rigorously. Using sterile forceps, we dipped each sterile disc into a different treatment cream before carefully placing it onto its corresponding quadrant. The previous steps were also used for our control group, deionized water, in a separate dish. Finally, we turned the plates upside down and incubated it for 48 hours. After incubation, we measured the zone of inhibition in millimeters with a ruler and recorded the results. We replicated this procedure 9 times over the course of 2 weeks.

Discussion

The results of our experiment partially supported our original hypothesis. After measuring the zone of inhibition of each trial and calculating the average, the results supported Miconazole being the most effective cream of inhibiting yeast growth with an average zone of 13.5mm. However, clotrimazole was the second most effective (11.8mm), not the least effective as we originally predicted. Terbinafine HCl showed the least inhibition with a zone of 0.889mm. Tolnaftate was mildly effective (3.22mm) but still significantly less than Miconazole and Clotrimazole. We are confident in the results, since our control, water, showed no signs of inhibition throughout all 9 trails (0mm).

Based on our results, Miconazole and Clotrimazole could be effective creams in treating vaginal yeast infections. We were influenced by an experiment done by a biology class in the summer of 2024. They concluded that over-the-counter (OTC) medications were more effective in inhibiting yeast growth than other holistic treatments. However, they only tested two OTC medications: Miconazole and Clotrimazole. Since OTC medications were the most effective, we tested further OTC medications to compare by adding two other common OTC treatments: Terbinafine HCl and Tolnaftate. The success of Miconazole in both experiments is apparent, but there is a significant difference of results for Clotrimazole. They measured an average of about 2.1mm (0.21cm) compared to 11.8mm. In the previous experiment, the students diluted the medications and holistic treatments with water for easy and equivalent application. Since we were only testing creams, we did not need to dilute any treatments with water. This difference in our procedures could have led to the increased effectiveness of clotrimazole in our trials.

In conclusion, we may have narrowed down the choices for effective treatment of yeast infections to two options: Miconazole and Clotrimazole. However, our research was limited by testing wine yeast. We recommend future research by testing these treatments against vaginal yeast samples.

Acknowledgements

Professor Lauren

Thank you for teaching us a new technique. We appreciate your continued support and wisdom throughout our experiment.

Bethany

Thank you for retrieving all the supplies needed and removing the disks after they had been in the incubator for 48 hours. We appreciate all your time and effort behind the scenes to make this possible.

References/ Work Cited

- Mijaljica, D., Spada, F., & Harrison, I. P. (2022). Emerging trends in the use of topical Antifungal-Corticosteroid combinations. *Journal of Fungi*, 8(8), 812. <https://doi.org/10.3390/jof8080812>
- Robert, M. E. M., & Kalia, Y. N. (2006). New developments in topical antifungal therapy. *American Journal of Drug Delivery*, 4(4), 231–247. <https://doi.org/10.2165/00137696-200604040-00006>
- Vandeputte, P., Ferrari, S., & Coste, A. T. (2011). Antifungal resistance and new strategies to control fungal infections. *International Journal of Microbiology*, 2012, 1–26. <https://doi.org/10.1155/2012/713687>
- Watkins, E., Chow, C. M., Lingohr-Smith, M., Lin, J., Yong, C., Tangirala, K., Collins, K., Li, J., Brooks, R., & Amico, J. (2023). Bacterial vaginosis treatment patterns, associated complications, and health care economic burden of women with Medicaid coverage in the United States. *Annals of Pharmacotherapy*, 58(5), 480–493. <https://doi.org/10.1177/10600280231190701>
- Baby, Dany. Yeast Infection Skin Rash Treatment. (n.d.). WebMD. <https://www.webmd.com/first-aid/yeast-infection-skin-rash-treatment>

Results of Kirby Bauer Experiment of Over-The-Counter Medications Against Yeast

OTC Medications	Avg. Inhibition Zone (mm)
Miconazole	13.5
Terbinafine HCl	0.889
Tolnaftate	3.22
Clotrimazole	11.8
Water	0.00

Table 1. Illustrates the results of our experiment using the Kirby Bauer method. We tested four anti-fungal creams and deionized water (control) against yeast to measure the zone of inhibition in millimeters.

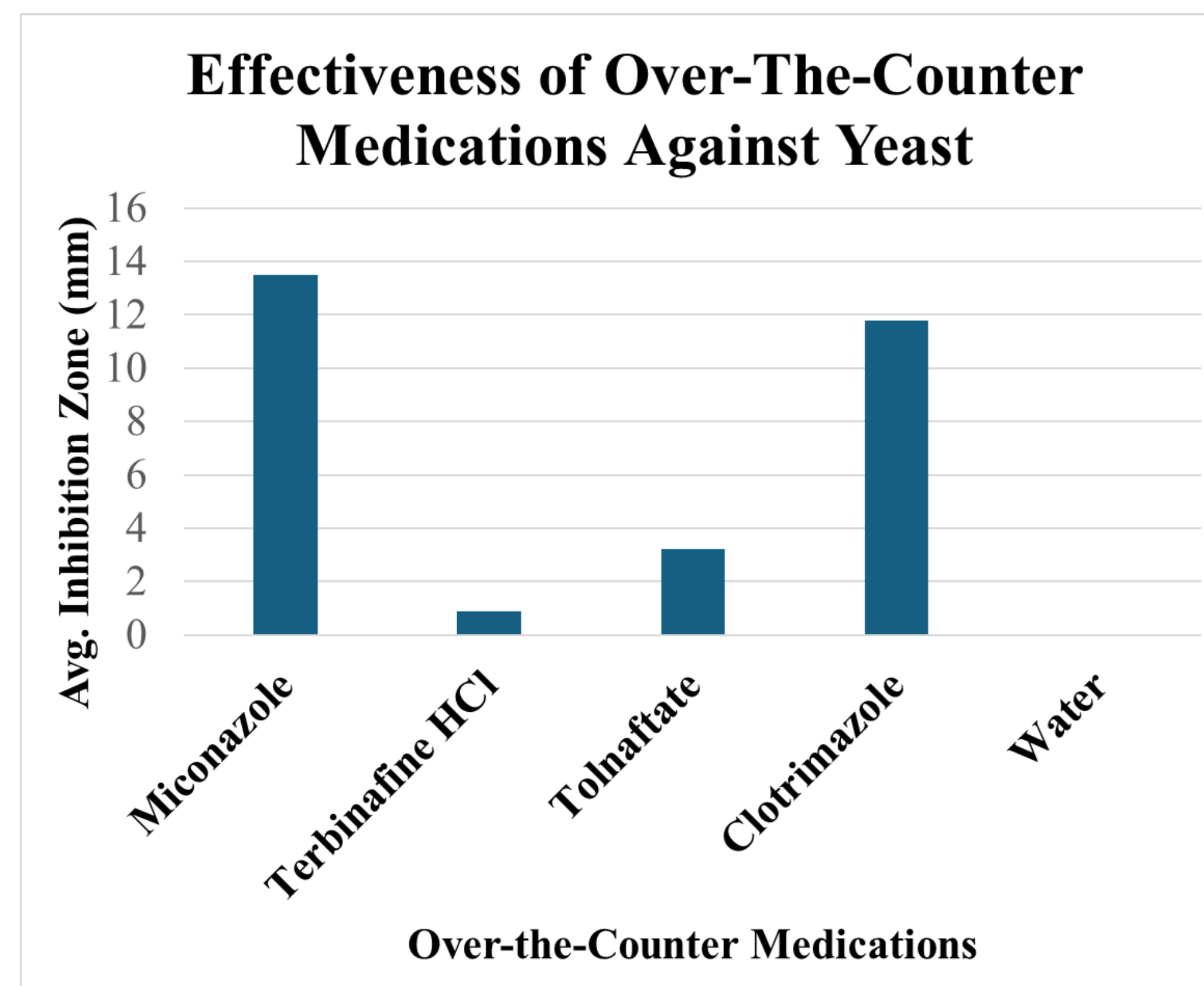


Figure 2. illustrates that Miconazole has the highest effectiveness of inhibition of yeast growth, while Terbinafine HCl has the lowest average of inhibition. Overall, Miconazole and Clotrimazole are both effective medications against yeast.