BIOLOGY LAB REPORT:

Investigating the effects of mouthwash on oral bacteria.

Introduction

Mouthwash targets bacteria in the mouth and are either antiseptic or antibacterial in nature. Antiseptics are antimicrobial substances that are applied to living tissue or skin to reduce the possibility of infection. Antiseptics are generally distinguished from antibiotics by the latter's ability to be transported through the lymphatic system to destroy bacteria within the body, and from disinfectants, which destroy microorganisms found on non-living objects. Some antiseptics are true germicides, capable of destroying microbes (bacteriocidal), whilst others are bacteriostatic and only prevent or inhibit their growth. Antibacterials are antiseptics that have the proven ability to act against bacteria.

An accumulation of oral bacteria can lead to a build-up of dental plaque (the material that adheres to the teeth and consists of bacterial cells, which if are not removed through flossing and brushing, can lead to gingivitis or periodontal disease). According to the American Dental Association, regular brushing and proper flossing are enough in most, and mouthwash should only be used as a short-term solution. Mouthwash may also be used to help remove mucus and food particles deeper down in the throat.

This experiment therefore aims to find out the effectiveness of mouthwash against oral bacteria. Mouthwash 'A' is 'Oral B – Natural Mint', an anti cavity mouthwash designed to prevent the occurrence of cavities in teeth. Mouthwash 'B' is 'Scope-Mint', is anti bacterial in nature. Mouthwash 'C' is 'Listerine-Cool Mint', is antiseptic. The last variable is distilled water, the control in the experiment.

1. <u>Purpose</u>
   This experiment aims to find out the effectiveness of mouthwash against oral bacteria.

2. <u>Hypothesis</u>
   Mouthwash C: Listerine-Cool Mint is the most effective mouthwash at inhibiting the growth of oral bacteria.

3. Variables

Independent Variables:

1. Types of mouthwash

Control Variables:

1. Length of time the filter paper is soaked in the mouthwash/distilled water
2. Length of time the filter paper is air dried before being placed on the agar.
3. Size of the filter papers
4. Number of filter papers
5. Type of agar
6. Temperature the petri dishes are incubated at
7. Time period for which petri dishes are incubated
8. Size of petri dish

Dependent Variables:

1. Size of the zone of inhibition

4. Materials

1. Nutrient agar plates
2. Sterile swabs
3. Filter paper discs
4. 3 brands of mouthwash
5. Forceps
6. Metric ruler
7. Incubator
8. Black marker
9. Distilled water
10. Masking tape

5. Method

Day 1

1. Working in groups of 2, obtain a nutrient agar plate from your teacher.
2. Without removing the lid, carefully turn the plate upside down and using a marker, divide the plate . into 4 quadrants.

3. label the quadrants.
4. Using the sterile swab, swab the inside of your cheek.
5. Open the petri dish and gently (so as not to destroy the agar) wipe the swab across the entire plate.
6. When finished swabbing the plate, quickly replace the lid.
7. Obtain three samples of mouthwash in small beakers.
8. Place a filter paper disc in each solution to soak for about lA s.
9. Carefully remove the lid from your agar plate and using forceps, place a soaked filter paper disc in each quadrant.
10. Make a note of which mouthwash disc was placed in which quadrant.
11. Seal the edges of your agar plate with tape. (From now on, the tape and lid are not to be removed!!)
12. Place your agar plate in the incubator for 48 hours.

Day 2

1. Obtain your group's agar plate from the incubator — DO NOT REMOVE TAPE
2. Observe the bacterial growth in each quadrant, compare the quadrants with mouthwash discs to the quadrant where no mouthwash disc was added.
3. Measure the area around each mouthwash disc that is free of bacteria (the zone of inhibition).
4. When finished, give your sealed agar plate to the teacher for disposal.

6. <u>Data Collection and Processing</u>

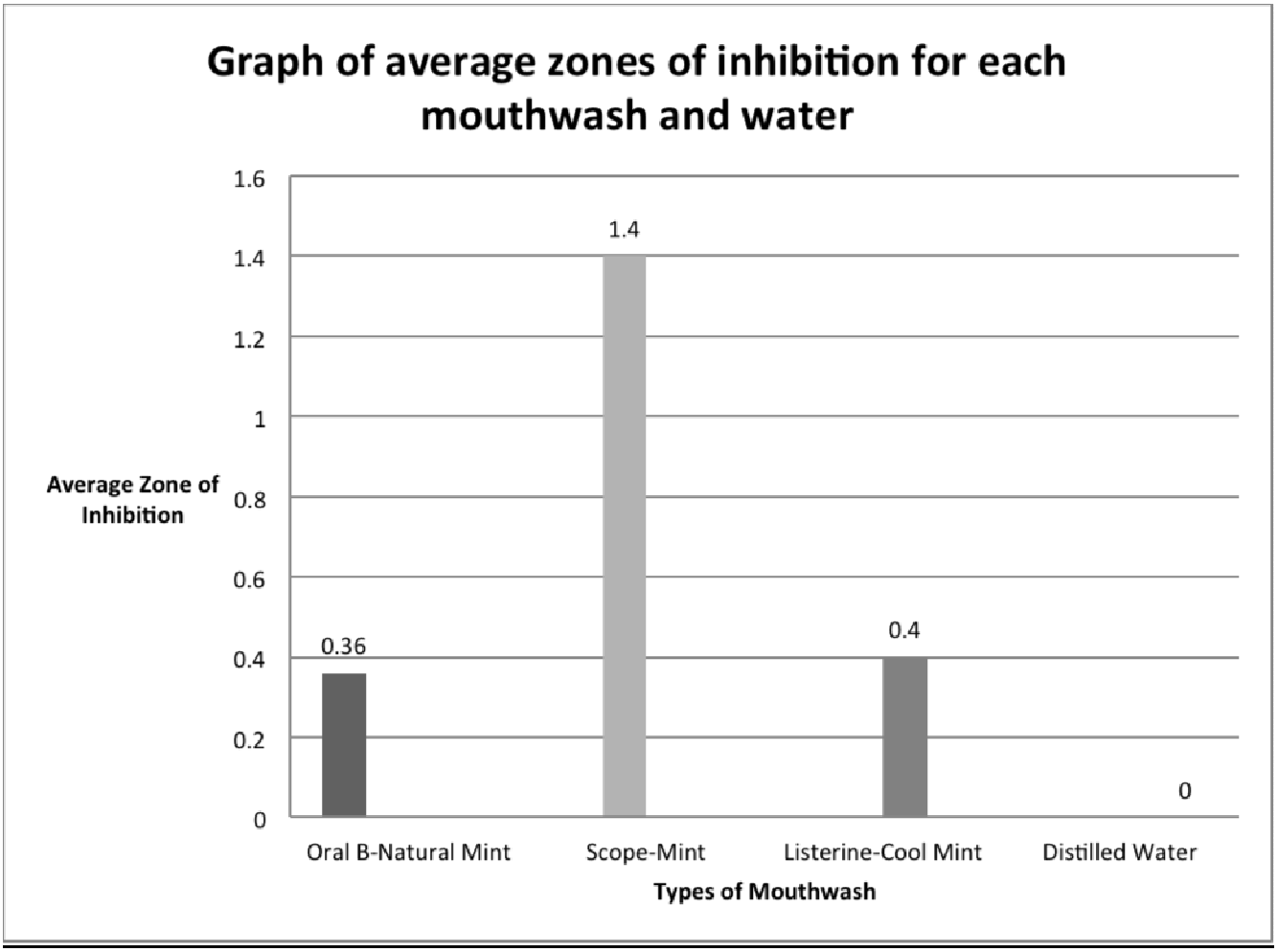
ii. Observations Chart

Observations - Put your money where your mouth is...

Type of Mouthwash	Zone of Inhibition #1	Zone of Inhibition #2	Zone of Inhibition #3	Zone of Inhibition #4	Average Zone of Inhibition
A. Oral B-Natural Mint	0.0cm	0.3cm	0.4cm	0.4cm	0.36cm
B. Scope-Mint	0.7cm	0.3cm	0.2cm	0.2cm	1.4cm
C. Listerine-Cool Mint	0.0cm	0.3cm	0.0cm	0.1cm	0.4cm
D. Distilled Water	0.0cm	0.0cm	0.0cm	0.0cm	0.0cm

A. Oral B-Natural Mint: 0.799¢/ml
B. Scope-Mint: 0.499¢/ml
C. Listerine-Cool Mint: 1.098¢/ml
D. Distilled Water

iii. Bar Graph



7. Conclusions and Evaluation

i. Which mouthwash was most effective at killing on slowing growth of mouth bacteria? Support your answers using your observations and data.

Mouthwash B: Scope-Mint. It showed an average zone of inhibition of 1.4cm, the highest average zone of inhibition on bacteria compared to the other mouthwashes.

ii. Which mouthwash was least effective at killing on slowing growth of mouth bacteria? Support your answers using your observations and data.

Mouthwash A: Oral B- Natural Mint. It showed an average zone of inhibition of 0.36cm, the lowest average zone of inhibition on bacteria compared to the other mouthwashes.

iii. How effective is water at killing mouth bacteria? Support your answers with your data.

Water is not at all effective at killing mouth bacteria. There was no zone of inhibition surrounding the filter paper soaked in water.

iv. Which mouth wash is the 'best buy'?

Scope-Mint.

v. Was your hypothesis correct or incorrect? Explain.

My hypothesis was incorrect. The experiment showed that Mouthwash B (Listerine-Cool Mint) an average zone of inhibition of 0.36cm, the lowest average zone of inhibition on bacteria compared to the other mouthwashes. Instead, mouthwash B (Scope-Mint).It showed an average zone of inhibition of 1.4cm, the highest average zone of inhibition on bacteria compared to the other mouthwashes.

vi. What are the weaknesses or limitations of the lab procedure?(at least 2)

The duration of the procedure was too short for substantial results to be observed.

There was uneven bacterial growth over the agar, leading to inaccurate zones of inhibition.

vii. What are your suggestions for improvements to the lab procedure?(based on the weaknesses listed in vi)

The duration of the procedure could be extended another day to allow for more bacterial growth for more accurate results in the experiment.

Ensure that the entire petri dish is completely swabbed without gaps in between.