

Deorose: Effectiveness of Rosemary (*Salvia Rosmarinus* Spenn.) Oil As Cream to Eliminate Body Odor-Causing Bacteria *Staphylococcus Hominis*

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DOI: <https://doi.org/10.51244/IJRSI.2025.12040151>

Received: 08 April 2025; Accepted: 17 April 2025; Published: 24 May 2025

INTRODUCTION

Body odor is produced when sweat comes into contact with bacteria on the skin, leading to various smells that can range from sweet to tangy or even onion-like, depending on the specific bacterial strains and the chemicals they generate. An unpleasant body odor can notably impact an individual's social life and mental health. While hygiene practices are often the primary factor contributing to body odor, they can also indicate underlying medical issues. In recent years, many people have turned to natural methods for body odor control, motivated by concerns regarding the potentially harmful effects of synthetic chemicals and additives in traditional products. As awareness grows around skin health, personal hygiene, and environmental sustainability, there has been a significant increase in demand for healthy, eco-friendly hygiene solutions. Additionally, worries about skin irritation, rashes, and the possible long-term health risks associated with chemical-based products have further propelled interest in natural alternatives.

Globally, odorants contain many chemicals that the human body can produce. When produced in small amounts, these chemicals are essential for normal biological functions and do not typically cause unpleasant odors. On the other hand, an excessive buildup of these substances on the skin may result in noticeable odors (Felman, 2023). Despite their widespread use, traditional deodorants and antiperspirants have caused concerns because of potential health risks. According to Penn Medicine (2024), specific individuals experience allergic responses to antiperspirants or deodorants. This study indicates that substances such as lanolin, parabens, vitamin E, essential oils (often utilized in scents), and propylene glycol, which provides structure to deodorant sticks, may be responsible. Thus, due to the growing trend towards safer and natural alternatives, there has become a greater interest in plant-based essential oils as natural deodorizers.

Several odor-causing bacteria have been seen in the human body, one of which is the presence of *Staphylococcus hominis*. It is a widespread Gram-positive bacterium that consistently and profusely inhabits human skin, appearing in large quantities in various body places (Sapkota, 2022). Its widespread prevalence across various populations indicates that it is a common occurrence. Studies conducted in countries like the United States, Europe, Asia, and South America have consistently identified that one of the main elements of the skin microbiome is *S. hominis* (Jiang et al., 2012). A study conducted in the United States by Grice et al. (2010) found that *S. hominis* was one of the most abundant bacterial species on the skin of healthy adults. Studies in Africa have also confirmed the existence of *S. hominis* in the skin microbiome of individuals from several regions (Ngondi et al., 2019). Some studies have linked *S. hominis* to skin conditions like acne and eczema, while others have suggested its potential benefits in protecting against it.

Promising alternatives were already available in the market, especially for treating *S. hominis*. Rosemary oil is one of the sought-after materials for treating different types of bacterial problems. Rosemary is an aromatic plant from the Lamiaceae family, known for its therapeutic properties. It has antioxidant and anti-inflammatory benefits and has been used in folk medicine, pharmaceuticals, and cosmetics (De Macedo et al., 2020). According to Jafari-Sales and Pashazadeh (2020), rosemary has significant antibacterial properties against *S. aureus* and *E. coli*, inhibiting various pathogenic bacteria, with 1.8 Cineole and α -pinene as the main compounds, with a result from *S. aureus* of 0.625 MIC and 1.25 MBC, *E. coli* of 1.25 MIC and 2.5 MBC. While various natural alternatives

show promising antibacterial properties against *S. aureus* and *E. coli*, exploring more plant alternatives remains essential. These findings highlight rosemary's capability as a herbal and effective antibacterial agent, providing promising applications in health and wellness solutions worldwide.

There are many effective ways to treat *S. hominis*, from natural treatments to systemic therapies. One of them is oregano oil, which, at a low concentration of 0.4%, has demonstrated good antibacterial activity against *S. hominis* due to its phenolic compounds, particularly carvacrol (Hirsch et al., 2024). Aziz et al. (2021) also found that rosemary oil, which contains 67% carvacrol, may help eliminate gram-positive bacteria such as *S. hominis*. Another example is lavender essential oil, a plant product that can improve the human immune system and has antibacterial properties against *S. hominis* (Gismondi et al., 2021). Those are promising natural treatments, including oregano oil; lavender has shown significant antibacterial properties when treating gram-positive bacteria like *S. hominis*. These plant alternatives feature the potential bacterial treatment, emphasizing the need for further study to enhance their application in medicine and healthcare.

Traditional remedies for personal care, including body odor management, have long been a part of ASEAN cultural practices. In Southeast Asia, humid environments often lead to body odor issues; Vietnam is no exception. Vietnamese individuals frequently face odor concerns, especially when riding motorcycles in the rain (Sovacool et al., 2021). Similarly, countries like Thailand have a long-standing tradition of utilizing herbal medicine, including plants with antibacterial and deodorizing properties (Thiengsusuk et al., 2013). In Malaysia, researchers stated that different types of DESs were used to get extracts from *Rosmarinus officinalis*, which showed they could fight against mycobacteria, likely by harming the bacteria's cell walls. However, for a clearer understanding, the compounds that showed activity in this research must go through a process of being separated and cleaned up.

Rosemary has been investigated for its antibacterial properties, with studies focusing on its ability to inhibit and kill bacterial strains through in vitro testing methods. In Turkey, researchers found that *R. officinalis* antibacterial activity was tested using the broth microdilution assay and the in vitro antibacterial activity to determine minimum inhibitory concentrations (MIC) and minimum bactericidal concentrations (MBC). The n-hexane fraction showed strong activity against *Staphylococcus aureus* (78 µg/mL), moderate activity against *Enterococcus faecalis* and *Helicobacter pylori* (both at 156 µg/mL), and weak or no activity against *Escherichia coli*, *Pseudomonas aeruginosa*, and *Mycobacterium smegmatis* (MIC > 1000 µg/mL). The ethyl acetate fraction exhibited moderate activity against *S. aureus* (312 µg/mL) and *E. faecalis* (625 µg/mL) but had no significant effect on the other tested bacteria (MIC > 1000 µg/mL). For comparison, the antibiotics chloramphenicol and tetracycline demonstrated much lower MICs, indicating stronger antibacterial effects, while amikacin was only active against *M. smegmatis* (250 µg/mL) (Karadağ et al., 2019). The antibacterial properties of *R. officinalis* demonstrate its potential as a natural solution for managing body odor. Further research will make it more effective, combining ancient techniques with contemporary science to provide safer alternatives for personal hygiene.

Essential oils are increasingly popular in do-it-yourself products due to their well-documented antibacterial and antifungal properties. Essential oils contain natural plant qualities that work as antibacterials and antifungals. These properties also prevent odor-causing bacteria from growing on the skin (Mascia, 2024). Rosemary (*Salvia rosmarinus*), a thorny plant commonly found in the Philippines, is known for its various health benefits (Ghasemzadeh, 2020). Body odor is a common issue (Mitro et al., 2012), often influenced by the country's humid climate, daily activities, and personal hygiene habits (Gregoriou et al., 2019). Too much sweating and bacteria on the skin can cause bad odors, which may lower confidence and affect social interactions with others. Traditional remedies like tawas and calamansi offer solutions, but may cause skin irritation. As awareness of natural personal care products grows, interest in plant-based alternatives with antibacterial properties continues to rise.

Studies on body odor solutions in the Philippines show a preference for natural remedies. According to Penn Medicine (2019), most Filipinos still rely on commercial deodorants, which often contain aluminum-based compounds that temporarily block sweat pores. Natural alternatives such as tawas (potassium alum) and apple cider vinegar (ACV) are commonly used due to their antibacterial properties. A study of alum indicates that a 5% alum solution created inhibition zones of 27 mm against *S. aureus* and 23 mm against *E. coli*, demonstrating

antimicrobial activity (Bnyan et al., 2014). Similarly to apple cider vinegar (ACV), known for its antibacterial and pH-balancing properties (O'Neill, 2020), showed inhibition zones ranging from 11 ± 0.7 mm to 19 ± 0.5 mm against various bacterial strains (Ousaid et al., 2021). Additionally, rosemary (*Salvia rosmarinus*) oil has demonstrated antibacterial activity, with studies reporting inhibition zones of 12 mm against *S. aureus* (Khasanova et al., 2021), making it a viable option for natural odor control. As awareness of natural and skin-friendly personal care products grows, the shift toward safer deodorizing solutions will continue (De Guzman, 2020).

The existing knowledge gap highlights the insufficiency of local studies focused on the antibacterial effectiveness of rosemary oil. Furthermore, additional research is necessary in the province to establish a direct connection between the efficacy of rosemary oil and the elimination of odor-causing bacteria. This study aims to assess the efficacy of rosemary oil. Rosemary's antibacterial properties can eliminate body odor. This study evaluates the effectiveness of this plant-based oil in preventing body odor-causing bacteria. The findings of this study acknowledge more natural solutions than the commonly used deodorants containing various chemicals to prevent body odor.

According to Daniel Moerman's Theory of Non-random Selection of Medicinal Plants, the evolutionary history of these plants plays a significant role in their choice for medicinal use. This theory seeks to show that traditional medicinal systems are logical and partially rely on the healing properties of plants (Arias, 2018). The theory of non-random selection of medicinal plants offers a valuable framework for comprehending why rosemary oil is selected for your research on eliminating body odor-causing bacteria. Ethnobiological investigations have focused on identifying factors that interfere with the criteria adopted for selecting plants, especially medicinal plants, by different populations, confirming the theory that plant selection is not random (Gomes et al., 2023).

Statement of the Problem

The main objective of this study was to evaluate the effectiveness of rosemary oil in inhibiting the growth of *S. hominis*, a bacterium associated with body odor. Specifically, the study addressed the following questions:

1. What is the zone of inhibition of *S. hominis* when rosemary oil as cream is subjected to the following concentrations:
 - 1.1. 50% concentration (5 g rosemary oil in 5 g of shea butter cream base);
 - 1.2. 25% concentration (2.5 g rosemary oil in 7.5 g of shea butter cream base); and
 - 1.3. 12.5% concentration (1.25 g rosemary oil in 8.75 g of shea butter cream base)?
2. What is the zone of inhibition of the bacteria when subjected to the commercial deodorant?
3. Is there a significant difference between rosemary oil and commercial deodorant in eliminating body odor-causing bacteria (*S. hominis*)?

Hypothesis

To answer the given problems listed in the preceding section objectively, the given null hypothesis was formulated:

Ho: There is no significant difference between using rosemary (*Salvia rosmarinus* Spenn.) oil and commercial deodorant in eliminating body odor-causing bacteria.

Significance of the Study

The result of this study would be beneficial to the following stakeholders:

Department of Health. This study could inform public health initiatives promoting natural hygiene and healthier skin care practices. It may influence policy decisions regarding natural deodorant products, potentially including rosemary oil as a safe and effective ingredient

Deodorant Manufacturing Companies. This study could provide valuable information for developing new, natural deodorant products, potentially utilizing rosemary oil as a safe and effective ingredient.

Individuals exhibit malodor. This study could help individuals feel less self-conscious about their body odor and provide them with a natural solution to a common concern. It could also give them knowledge of natural remedies for the common problem.

Future Researchers. The study could provide valuable data on the effectiveness and safety of rosemary oil cream for preventing body odor, paving the way for further research and development of natural deodorant products.

Scope and Limitations

This study focused on terminating *S. hominis*, a specific bacterium found in the armpit that contributes to foul body odor. Conducted in a laboratory center in Davao del Sur, from October 2024 to April 2025, the study aimed to evaluate the effectiveness of rosemary oil cream in eliminating this bacterium. The bacteria were legally acquired and exposed to the independent variable, with any reduction or elimination documented for future research. Utilizing a true experimental research design, the study observed the bacteria's response to the rosemary cream, following proper formulation procedures based on existing literature on rosemary oil's antimicrobial properties.

While this study sought to provide insights into the potential of rosemary oil as a natural deodorant alternative, it did not explore long-term effects or its impact on individuals with pre-existing skin conditions or allergies. The study only focuses on three concentrations (5%, 25%, and 12.5%) and does not explore higher or lower doses that might affect the results. In addition, the researchers only fermented the rosemary oil for two weeks, which may affect the potency of its antimicrobial properties compared to longer infusion periods. It also did not assess the shelf life of the product, which is also an important factor in its overall effectiveness and safety. Lastly, the study only compares rosemary oil cream to a commercial deodorant, limiting its scope in comparing other natural alternatives.

Definition of Terms

The following terms were defined and elaborated on to ensure a clear and accurate understanding of the key components of this study.

Bacterial Inhibition. Bacterial Inhibition is an area of media where bacteria are impotent to grow, caused by the presence of a drug that impedes their growth. (LibreTexts, 2024). It refers to the in vitro level of resistance of *S. hominis* strains to rosemary oil.

Body Odor. Body odor occurs when sweat interacts with skin bacteria (Professional, 2025). It refers to the bacteria that causes the odor. It was measured after the cream is applied in three concentrations and inhibits the growth of odor-causing bacteria.

Rosemary Oil. Rosemary is an evergreen plant that is related to a mint family called Lamiaceae, its leaves are utilized to flavor foods (Britannica, 2025). In scientific terms, *Salvia rosmarinus* is an active ingredient in a cream formulation that reduces or eliminates bacteria that cause body odor.

Staphylococcus hominis. *S. hominis* is a gram-positive coccus that is positive for catalase and divides into irregular clusters, resembling a bunch of grapes when observed under a microscope (Notes, 2024). It refers to the bacteria that can cause body odor.

Zone of Inhibition. The zone of inhibition is a circular area surrounding the antibiotic spot where bacteria colonies cannot grow (Hartline, 2023). It is used to measure the effectiveness of the alternative.

METHODS

This chapter encompasses the methodologies employed in carrying out the study. It covers aspects such as

research design, the subject of the study, sampling procedure, data gathering, and measuring.

Research Design

In this study, the researchers implemented a true experimental strategy, specifically utilizing the posttest-only design. In this design, subjects were randomly assigned to treatment and control groups. After an initial measurement of the dependent variables of interest, the treatment group received a treatment, and the dependent variables were measured again (Bhattacharjee, 2012). These data were then compared between groups to evaluate the effectiveness of the treatment or intervention (Renbarger & Morgan, 2018). This approach allowed for a thorough comparative analysis of the effects of the treatment.

Additionally, the investigation aimed to determine if *Salvia rosmarinus* could be used as an ingredient in an antimicrobial cream targeting *Staphylococcus hominis*, a bacterium associated with body odor. Therefore, the study employed a posttest-only design. This is distinct from the pretest-posttest non-equivalent comparison group design, wherein a treatment group receives a pretest, undergoes a treatment, and subsequently takes a posttest. Meanwhile, a non-equivalent comparison group also took a pretest but did not receive the treatment, followed by a posttest (Jhangiani et al., 2019). This design allowed researchers to examine bacterial growth changes following plant exposure without requiring an initial measurement. Therefore, the posttest-only design was chosen for this study to analyze bacterial growth in samples after exposure to varying plant extract concentrations, suggesting that this was the most suitable design for the study.

Subject of the Study

This research focused on eliminating bacteria, especially *S. hominis*, a gram-positive staphylococcus that primarily exists as a commensal organism on human skin. This bacterium can exist in moist areas of the body, like axillae (underarms), with several apocrine glands that keep hold of some amount of moisture (Sapkota, 2022). This bacterium can cause a bad odor on the skin.

This study evaluated the effectiveness of *Rosemary's* antibacterial properties in an oil extract on eliminating *S. hominis*, using three (3) cultured *S. hominis* for each test and another three (3) for the control group as subjects. The bacteria were cultured by a licensed Medical Technologist in Tagum City and taken directly from a patient's eye. The study was focused on eliminating bacteria; they did not consider variables such as sex, side effects on the skin, or lifestyle. The research was conducted on the property of Digos Doctors Hospital. The facility was in control of carrying out the experiment and providing the necessary equipment to carry out the study.

Sampling Technique

This experiment used a Complete Random Design (CRD) to ensure unbiased results. Bacterial samples were selected randomly, preventing any influence on the selection process. This approach improves the credibility of the findings by eliminating bias. DiCiaccio (2023) stated that researchers often use CRD for observation and data collection. The design relies on distribution to make statistical inference while maintaining strong internal validity through randomization. This ensures each strain has an equal chance of being tested, reducing bias and increasing representativeness. Additionally, random sampling enhances external validity by making the results more applicable to the broader population of *Staphylococcus hominis*.

Data Gathering Procedure

Data collection procedures were essential to the research process, contributing to the results' reliability and validity. This part of the research report elaborates in detail the methods used to collect the data, clearly understanding the process of obtaining the required information. Prior to data collection, we obtained formal permission from the school principal to ensure ethical compliance. Additionally, pre-experimental protocols are done to prepare the environment as well as the participants.

A. Collection and Extraction of Plant Materials

1. The researchers gathered and washed sufficient quantities of fresh and healthy rosemary sprigs.

2. The rosemary was dried and placed three-quarters of the way full in a 12oz clean glass jar.
3. The Asteria Apothecary Coconut oil Extra Virgin (carrier oil) was added, allowed to infuse for some time, and extracted using a strainer and cheesecloth.
4. All materials utilized were sterilized using alcohol to prevent bacterial contamination.

B. Formulation of Concentrations

The collected rosemary leaves were dried and infused with a carrier oil to extract the rosemary oil. The extracted oil was produced by the maceration method (Alzomor et al., 2015). The extracted rosemary oil was then added to a cream base and gently stirred to combine the oil and the base.

1. Test 1, a 50% concentration of rosemary oil, was prepared by adding 5 g of rosemary extract to 5 g of cream base. The concentration was computed by multiplying the mass of the rosemary oil (50%) by the total mass of the mixture (10 g).
2. Test 2, a 25% concentration of rosemary oil, was prepared by adding 2.5 g of rosemary extract to 7.5 g of cream base. The concentration was computed by multiplying the mass of the rosemary oil (25%) by the total mass of the mixture (10 g).
3. Third, for test 3, a 12.5% concentration of rosemary oil was prepared by adding 1.25 g of rosemary extract to 8.75 g of cream base. The concentration was computed by multiplying the mass of the rosemary oil (12.5%) by the total mass of the mixture (10 g).
4. The control group served as a baseline for comparison, which was a commercial antibacterial deodorant.

C. Preparation of Bacterial Strain and Culture Media

1. *Staphylococcus hominis* bacteria were obtained from a Davao Regional Medical Center laboratory in Tagum City.
2. The bacteria were placed in a petri dish, a culture medium for storing bacteria or microorganisms.
3. The culture medium was isolated and placed in a controlled environment to maintain its bacterial growth and culture.

D. Determination of the Antimicrobial Activity

1. A fresh culture of *Staphylococcus hominis* was prepared by inoculating the bacteria into a nutrient broth and incubating them at 37°C for 24 hours to promote active growth (Bok et al., 2024).
2. Mueller-Hinton agar was sterilized and poured into sterile Petri dishes. The agar was allowed to cool and solidify under aseptic conditions to prevent contamination (Kehal et al., 2023).
3. A sterile cotton swab was used to evenly spread the bacterial suspension across the agar surface, creating a uniform lawn of bacteria (Shah et al., 2023).
4. The bacterial suspension was standardized to a 0.5 McFarland turbidity standard to ensure consistent bacterial density. A sterile cotton swab was then used to evenly distribute the suspension across the agar surface, creating a uniform bacterial lawn (Ranson, 2020).

4.1. The area was consistently monitored, and measurements were taken to track its effectiveness.

5. Wells were made in the agar plates using a sterile cotton swab. Enough space was left between the holes to prevent the inhibition zones from overlapping (Dominguez, 2019).

6. Each well was filled with 50 μ L of test ointments containing rosemary oil at 12.5%, 25%, and 50% concentrations. Another well was filled with 50 μ L of a commercial deodorant to act as the control. Each treatment was tested using three agar plates to ensure the consistency and reliability of results.
7. The inoculated plates were placed in an incubator set at 37°C for 24 hours to allow bacterial growth and the ointments to exert their antimicrobial effects (Genesi et al., 2023).
8. After incubation, the plates were checked for clear zones around the wells, indicating bacterial inhibition. The diameter of each zone of inhibition (ZOI) was measured precisely using a caliper or ruler and recorded in millimeters.
9. The diameters of the zones of inhibition (ZOI) for each concentration of rosemary oil were compared to assess their antimicrobial activity. The ZOI of the commercial deodorant served as a benchmark to evaluate how effective the rosemary oil formulations were in comparison.

Measures

This quantitative study utilized the agar well diffusion method, a widely recognized technique introduced by Naskar et al. (2020), to evaluate the antibacterial activity of rosemary oil against *S. hominis*. Plates were incubated for 24 hours at 37°C, and the Zone of Inhibition (ZOI) diameter surrounding each well was measured with a ruler to determine the oil's antibacterial effectiveness. The essential oil of rosemary demonstrated an impressive level of antimicrobial activity, with 65% of anti-infectious activity studies highlighting its effectiveness (Anastasiou et al., 2019). This high level of efficacy demonstrates the potential of rosemary oil as a natural antibacterial agent. Additionally, Hudzicki (2016) was used to interpret the zone of inhibition to assess the antibacterial activity of the ointment. The diameter of the inhibition zone was deemed resistant if it measured less than 14 mm, moderate if it ranged from 15 to 17 mm, and sensitive if it was 18 mm or greater.

Salvia rosmarinus-derived ingredients were most frequently reported to function in cosmetics as skin Conditioning or fragrance agents. Based on studies done on animals and humans, rosemary oil has been proven safe to use (Fiume et al., 2018). Through the study, the researchers aimed to determine the therapeutic potential of rosemary oil as a natural antimicrobial agent against *S. hominis*. The observations were collected and categorized based on the Interpretation Table and systematically analyzed to understand rosemary oil's antibacterial efficacy and potential applications in addressing body odor-related bacterial activity.

Table 1. Staphylococcus Hominis' Growth Inhibition Interpretation

Mean Score Interval	Descriptive Equivalent	Interpretation
≥ 18 mm	Susceptible	The antibacterial activity provided an excellent picture of the zone of inhibition.
15.00 mm –17.00 mm	Moderate	The antibacterial activity indicated a reasonable zone of inhibition.
≤ 14 mm	Resistant	The antibacterial activity produced a poor representation of the zone of inhibition.

Data Analysis

The mentioned statistical procedure was used to examine the collected data and respond to the study's research questions:

1. Descriptive statistics, measures of central tendency, or the mean was used to summarize the effect of rosemary treatment on bacterial elimination. According to Starbuck (2023), they are a basic analysis

method that aids in properly describing and summarizing the data for a variable. The mean was calculated by getting the sum of all the figures within the data set and dividing the number of figures within the set.

2. Analysis of Variance (ANOVA) analysis was used as a means to test three or more groups of data, such as different concentrations of rosemary extract, to identify if there are any statistically significant differences in their effectiveness at reducing or eliminating bacterial growth. ANOVA is a statistical test to assess the difference between the means of more than two groups (Kenton, 2024).
3. Tukey's honestly significant difference (HSD) was used to compare multiple groups, such as different concentrations of rosemary extract, to determine which specific pairs of groups show statistically significant differences in their effectiveness at eliminating bacterial growth. Tukey's HSD calculated the honest significant difference between the two means with the use of analytical distribution (Nanda et al., 2021).

RESULTS AND DISCUSSION

This chapter deals with the presentation, analysis, and interpretation of data. The first part describes the levels of antibacterial activity of each concentration. The second part presents the significance of the difference among different concentrations of rosemary oil in inhibiting the growth of *Staphylococcus hominis*.

Inhibitory Activity of Rosemary Oil Cream Against *Staphylococcus hominis*

The study determined the effectiveness of the rosemary oil as cream on the growth inhibition of *S. hominis* with three different treatments: Treatment 1 - 5 g rosemary oil in 5 g of shea butter cream base; Treatment 2 - 2.5 g rosemary oil in 7.5 g of shea butter cream base; and Treatment 3 - 1.25 g rosemary oil in 8.75 g of and shea butter cream base. The researchers determined the inhibitory activity on each concentration by seeing the zone of inhibition per treatment in each replication (R1, R2, R3). Hence, the researchers obtained the following results.

Table 2. Inhibitory Activity of Rosemary Oil Cream Against *Staphylococcus hominis*

Treatments	Zone of Inhibition (in mm)			Mean	SD	Description
	R1	R2	R3			
T1	11	7	15	11.00	4.00	Resistant
T2	9	8	20	12.33	6.66	Resistant
T3	13	14	16	14.33	1.53	Moderate

Table 2 shows the antimicrobial activity of different concentrations of rosemary essential oil on the inhibition of *S. hominis*. The results indicate that the treatments exhibited antimicrobial activity against *S. hominis*. The sample treated with T1, which contains 5 g of rosemary oil mixed with 5 g of shea butter cream base, showed the lowest zone of inhibition compared to the other treatments. T2, which contains 2.5 g of rosemary oil in 7.5 g of the cream base, and T3, with 1.25 g of rosemary oil in 8.75 g of the cream base, were also tested. T3 displayed the lowest standard deviation of 1.53 mm, indicating minimal variation and consistent antibacterial effects across the three replicates. In contrast, T1 exhibited a slightly higher standard deviation of 4.00 mm, suggesting moderate variability in its inhibition zones. T2 had the highest standard deviation of 6.66 mm, indicating significant variability and inconsistent antibacterial effects. The broad range of inhibition zones observed in T2, which spanned from 8 mm to 20 mm, may reflect inconsistencies in the treatment effectiveness.

This finding supports the study of Sales and Pashazadeh (2020), which proves the significant antibacterial properties of rosemary (*Rosmarinus officinalis*) essential oil against *Staphylococcus aureus* and *Escherichia coli*, which is *S. aureus* is a close relative of *S. hominis*. Their research identified key bioactive compounds such as 1,8-cineole and α -pinene, which contributed to the inhibitory effects on bacterial growth. They also discovered that even small amounts of rosemary oil (0.625%) were enough to slow down *S. aureus*, similar to how it worked against *Staphylococcus hominis* in this study. Additionally, their findings showed a zone of inhibition (ZOI)

ranging from 12 mm to 22 mm, depending on the concentration of rosemary oil applied.

Inhibitory Activity of Commercial Treatment Against *Staphylococcus hominis*

The study included the inhibitory activity of the positive control using commercial treatment for *S. hominis* using an antibacterial deodorant. A zone of inhibition test was utilized to determine the antibacterial activity of commercial deodorant against *S. hominis*. A fresh bacterial culture was employed for the same. The bacterial suspension was streaked evenly on agar plates using a sterile pipette. To determine the antibacterial activity of commercial deodorant, 0.027 ml of antibacterial deodorant extract was placed on the agar plates' surface using a sterile pipette. The plates were incubated at temperatures of 35 to 37°C for 24 hours to offer a chance for diffusion of antibacterial compounds and interaction with bacterial growth. However, the result revealed that commercial deodorant failed to produce any detectable zone of inhibition, which reveals a failure of appreciable antibacterial action against *S. hominis*. Failure to obtain a zone of inhibition reveals that the antibacterial deodorant lacks significant antibacterial activity against *S. hominis* under the conditions under investigation.

Table 3. Inhibitory Activity of Commercial Treatment Against *Staphylococcus hominis*

Treatments	Zone of Inhibition (in mm)			Mean	SD	Description
	R1	R2	R3			
Commercial Deodorant	0	0	0	0.00	0.00	Resistant

These findings support the study conducted by Egbuobi et al. (2012), which evaluated the antibacterial activities of 20 different deodorants, including 14 roll-ons and 6 sprays, against various bacteria such as *Staphylococcus epidermidis*, *Proteus mirabilis*, *Escherichia coli*, and *Pseudomonas aeruginosa*. The study found that 10% of the deodorants showed no significant antibacterial activity, indicated by zones of inhibition (ZOI) of 2 mm or less. Additionally, some of the deodorants tested displayed a 0% effectiveness against these bacteria.

Significant Difference in the Inhibitory Activity of Rosemary Oil Cream and Commercial Treatment Against *Staphylococcus hominis*

Table 4 shows the results of a one-way analysis of variance to determine the significance of the difference in the effectiveness of different concentrations of rosemary oil and the control commercial treatment on the inhibition of *S. hominis* growth. It can be observed that the F value is 7.906 with 3 and 8 degrees of freedom. The p-value is 0.009, which is less than 0.05. This further means that the null hypothesis should be rejected, indicating that at least one of the treatments significantly differs from the other in terms of its effectiveness on the inhibition of *S. hominis* growth.

Table 4. Significant Difference in the Inhibitory Activity of Rosemary Oil Cream and Commercial Treatment Against *Staphylococcus hominis*

	Sum of Squares	df	Mean Square	F	p	Decision
Between Groups	371.583	3	123.861	7.906	0.009	Reject H_o
Within Groups	125.333	8	15.667			(Significant)
Total	496.917	11				

To determine which of the three concentrations significantly differed from the others, a post hoc analysis was conducted, specifically pairwise comparisons of sample means using the Tukey HSD test. The Tukey's Honestly Significant Difference (HSD) test is used to assess differences among sample means for significance. This test compares all pairwise differences while controlling the probability of making one or more Type I errors. The

Tukey's HSD test is one of several methods designed for this purpose and fully controls the Type I error rate (Salkind, 2010).

Meanwhile, Table 5 presents the results of the post hoc comparisons conducted using the Tukey HSD test. The results show the significant differences between the control group and rosemary treatments, with T1 (MD = 11.000, $p = 0.038$), T2 (MD = 12.333, $p = 0.021$), and T3 (MD = 14.333, $p = 0.009$) showing a significant difference from the control. However, no significant differences were found between the treatment groups themselves: T1 and T2 ($M = -1.333$, $p = 0.975$), T1 and T3 ($M = -3.333$, $p = 0.737$), and T2 and T3 ($M = -2.000$, $p = 0.923$). These findings suggest that while each treatment differs from the control, the treatments are not significantly different from one another. This suggests that the rosemary treatments have a comparable inhibition capacity in the growth of *S. hominis*.

Table 5. Post Hoc Comparisons using the Tukey HSD Test

	Mean Difference	p	Decision	Interpretation
Between T1 and T2	-1.333	0.975	Fail to Reject H_o	Not Significant
Between T1 and T3	-3.333	0.737	Fail to Reject H_o	Not Significant
Between T1 and Control	11.000	0.038	Reject H_o	Significant
Between T2 and T3	-2.000	0.923	Fail to Reject H_o	Not Significant
Between T2 and Control	12.333	0.021	Reject H_o	Significant
Between T3 and Control	14.333	0.009	Reject H_o	Significant

These results are supported by the study of Nakagawa et al. (2020), which found that compounds in rosemary, such as carnosic acid and carnosol, effectively inhibit the quorum sensing system of *S. aureus*, thereby reducing its virulence. Additionally, research by Issabeagloo et al. (2012) reported that rosemary essential oil exhibited inhibitory effects against various *Staphylococcus* species, including *S. aureus*, *S. epidermidis*, and *S. saprophyticus*. Similarly, Nieto et al. (2018), which evaluated the antimicrobial effects of an aqueous extract of rosemary and found that it significantly inhibited the growth of foodborne pathogens such as *Listeria monocytogenes* and *Salmonella typhimurium*. This indicates that even water-based rosemary extracts retain potent antibacterial activity. Additionally, research conducted by Koc et al. (2015) assessed the effectiveness of a methanolic extract of rosemary against various bacterial strains and observed notable inhibition of *Pseudomonas aeruginosa* and *Bacillus subtilis*, further demonstrating the broad-spectrum antibacterial potential of rosemary extracts.

Numerous studies have highlighted the antimicrobial properties of rosemary essential oil. However, some research suggests that its effectiveness may be limited when compared to other essential oils. A study conducted by Sienkiewicz et al. (2013) compared the antibacterial activities of basil and rosemary essential oils against various strains of *Escherichia coli*. The results indicated that basil oil had stronger inhibitory effects than rosemary oil. Specifically, the minimum inhibitory concentrations (MICs) for basil oil ranged from 8.25 to 11.5 $\mu\text{L/mL}$, while those for rosemary oil fell between 18.0 and 20.0 $\mu\text{L/mL}$.

SUMMARY

This study aimed to assess the antimicrobial effectiveness of rosemary (*Salvia rosmarinus* Spenn.) oil cream against *Staphylococcus hominis*, a key bacterium responsible for body odor. A complete random design (CRD) methodology was employed to minimize bias and ensure the reliability of the results. Different concentrations of rosemary oil (1.25%, 2.5%, and 5%) were tested to determine their inhibitory effects. The study utilized an experimental research design and employed the zone of inhibition (ZOI) method to measure antibacterial activity. Statistical analysis using one-way ANOVA shows a significant difference among treatments, with an

F-value of 7.906 and a p-value of 0.009, indicating that at least one formulation was notably more effective in bacterial inhibition.

The results suggest rosemary oil's potential as an alternative antibacterial agent for the management of body odor. The notable inhibitory activity found indicates that rosemary oil might be used as a natural remedy to fight *Staphylococcus hominis* that cause odors in personal body care products. Future studies should focus on its long-term stability and possible side effects, which should all be investigated further to increase its efficiency.

CONCLUSION

Acknowledging the pressing need for effective solutions in treating body odor compounded by *Staphylococcus hominis* infections, this research explores the potential of utilizing a cream derived from *Salvia rosmarinus*. This study aims to assess the efficacy of rosemary oil. The findings of this study yield the following conclusions:

1. The results indicate that all treatments exhibited antimicrobial activity against *S. hominis*, although their effectiveness varied significantly. Treatment 1 and treatment 2 demonstrated only a slight amount of inhibition, suggesting inconsistent effects on *S. hominis*. However, treatment 3 treatment showed moderate inhibition even at the lowest concentration.
2. The outcome indicates the commercial deodorant could not inhibit the growth of *Staphylococcus hominis* since there were no areas free of bacterial growth around the deodorant; thus, the deodorant failed altogether against these types of bacteria.
3. The results indicate a remarkable difference in the antibacterial activity of rosemary oil cream relative to commercial agents against *S. hominis*, a productive agent of body odor. The statistical analysis supports that rosemary oil cream can inhibit the growth of *S. hominis*, with the evidence for this being significant differences compared with the control. However, concentration-wise comparisons across all treatments of the rosemary showed no significant differences; they were equally effective in reducing bacterial growth. This suggests a great promise for rosemary oil cream as an alternative to those commercially available in eliminating bacteria responsible for body odor.

RECOMMENDATIONS

These findings lead the researchers to suggest the following:

1. The researchers suggest that the Department of Health leverage the advantages of rosemary oil, particularly for deprived consumers who might benefit from it. This study emphasizes that natural solutions like rosemary oil can successfully eradicate bacteria such as *S. hominis*, rather than depending exclusively on commercial products.
2. The outcome indicates the commercial deodorant was unable to inhibit the growth of *S. hominis*, since there were no areas free of bacterial growth around the deodorant; thus, the deodorant failed altogether against these types of bacteria. This means not all commercial deodorants can kill or slow down bacteria that lead to body odor. The researchers suggest finding a more effective control group that still utilizes antibacterial properties.
3. For individuals, be very careful in choosing a product as not all oil base deodorants are effective. Who are having body odor problems, being knowledgeable about the effectiveness of rosemary oil extract (*Salvia rosmarinus* Spenn.) will help individuals feel less self-conscious about their body odor and provide them with a natural solution to a common problem. The researchers suggest that rosemary oil be used as a treatment for unwanted body odor.
4. Future research should focus on enhancing the effectiveness of rosemary oil extract in its active chemicals on fighting odor causing bacteria. This includes the physical state, the chemical, and concentration period of the cream over time, while assessing any potential alterations in its antibacterial property.

REFERENCES

1. Abdulkarim Kassem Alzomor, Mansour, N., & Shamsan Mohammed Al-Zubaidi. (2015, June 24). Extractions and formulation of rosemary as anti-wrinkle cream and gel. <https://www.researchgate.net/publication/282158055>
2. Arias, D. M. R. (2018). The Non-random Selection of Medicinal Plants Theory: A case study of a Kichwa community in the Ecuadorian Amazon - ProQuest. <https://www.proquest.com/openview/ac9eac609a78868e252f9a1b51a411aa/1?pq-origsite=gscholar&cbl=18750>
3. Aziz, E., Batool, R., Akhtar, W., Shahzad, T., Malik, A., Shah, M. A., Iqbal, S., Rauf, A., Zengin, G., Bouyahya, A., Rebezov, M., Dutta, N., Khan, M. U., Khayrullin, M., Babaeva, M., Goncharov, A., Shariati, M. A., & Thiruvengadam, M. (2021). Rosemary species: a review of phytochemicals, bioactivities and industrial applications. *South African Journal of Botany*, 151, 3–18. <https://doi.org/10.1016/j.sajb.2021.09.026>
4. Bok, J., Choi, J., Lee, S., Lim, T. H., & Jang, Y. (2024). Antibacterial and deodorizing effects of cold atmospheric plasma-applied electronic deodorant. *Scientific Reports*, 14(1). <https://doi.org/10.1038/s41598-024-53285-9>
5. Bnyan, I. A., Alta'ee, A. H., & Kadhum, N. H. (2014). Antibacterial Activity of Aluminum Potassium Sulfate and Syzygium Aromaticum Extract Against Pathogenic Microorganisms. *Journal of Natural Sciences Research*, 4(15), 137–141. <https://www.iiste.org/Journals/index.php/JNSR/article/view/14580>
6. De Guzman, E. (2020). Consumer Attitudes Towards Natural Personal Care Products in the Philippines. *Philippine Journal of Marketing*. <https://philippinemarketingjournal.com/>
7. Dominguez, J. (2019). Exploring the potential of endophytes and medicinal plants as sources of antimicrobials to control citrus greening. <https://doi.org/10.25148/etd.fidc008889>
8. Egbuobi, B., Ojiegbe, G., Dike-Ndudim, J., & Enwuru, P. (2012). Antibacterial activities of different brands of deodorants marketed in Owerri, Imo state, Nigeria. *African Journal of Clinical and Experimental Microbiology*, 14(1). <https://doi.org/10.4314/ajcem.v14i1.4>
9. Felman, A. (2023, April 24). What to know about body odor. <https://www.medicalnewstoday.com/articles/173478>
10. Genesi, B. P., De Melo Barbosa, R., Severino, P., Rodas, A. C., Yoshida, C. M., Mathor, M. B., Lopes, P. S., Viseras, C., Souto, E. B., & Da Silva, C. F. (2023). Aloe vera and copaiba oleoresin-loaded chitosan films for wound dressings: microbial permeation, cytotoxicity, and in vivo proof of concept. *International Journal of Pharmaceutics*, 634, 122648. <https://doi.org/10.1016/j.ijpharm.2023.122648>
11. Gismondi, A., Di Marco, G., Redi, E. L., Ferrucci, L., Cantonetti, M., & Canini, A. (2021). The antimicrobial activity of *Lavandula angustifolia* Mill. essential oil against *Staphylococcus* species in hospital environment. *Journal of Herbal Medicine*, 26, 100426. <https://doi.org/10.1016/j.hermed.2021.100426>
12. Gomes, L. C. A., De Medeiros, P. M., & Prata, A. P. D. N. (2023). Wild food plants of Brazil: a theoretical approach to non-random selection. *Journal of Ethnobiology and Ethnomedicine*, 19(1). <https://doi.org/10.1186/s13002-023-00603-6>
13. Gregoriou, S., Sidiropoulou, P., Kontochristopoulos, G., & Rigopoulos, D. (2019). Management Strategies of Palmar Hyperhidrosis: Challenges and Solutions. *Clinical Cosmetic and Investigational Dermatology*, Volume 12, 733–744. <https://doi.org/10.2147/ccid.s21097>
14. Hartline, R. (2023). 1.40: Bacterial susceptibility to antibiotics (Kirby-Bauer test). *Biology LibreTexts*. [https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_Laboratory_Manual_\(Hartline\)/01%3A_Labs/1.40%3A_Bacterial_Susceptibility_to_Antibiotics_\(Kirby-Bauer_Test\)](https://bio.libretexts.org/Bookshelves/Microbiology/Microbiology_Laboratory_Manual_(Hartline)/01%3A_Labs/1.40%3A_Bacterial_Susceptibility_to_Antibiotics_(Kirby-Bauer_Test))
15. Hirsch, U. M., Jablonska, M., Neelam, N., Teuscher, N., & Schmelzer, C. E. H. (2024). Oregano, thyme, and lemongrass essential oils as antimicrobial agents in gelatin for photographic films. *European Journal of Lipid Science and Technology*, 126(3). <https://doi.org/10.1002/ejlt.202300198>
16. Hudzicki, J. (2016). Kirby-Bauer Disk Diffusion Susceptibility Test Protocol. American Society for Microbiology. <https://asm.org/getattachment/2594ce26-bd44-47f6-8287-0657aa9185ad/Kirby-Bauer-Disk-Diffusion-Susceptibility-Test-Protocol-Pdf.pdf>
17. Issabeagloo, N. E. (2012). Antimicrobial effects of rosemary (*Rosmarinus officinalis* L.) essential oils against *Staphylococcus* spp. *African Journal of Microbiology Research*, 6(23).

<https://doi.org/10.5897/ajmr12.741>

18. Jafari-Sales, A., & Pashazadeh, M. (2020). Study of chemical composition and antimicrobial properties of Rosemary (*Rosmarinus officinalis*) essential oil on *Staphylococcus aureus* and *Escherichia coli* in vitro. *International Journal of Life Sciences and Biotechnology*, 3(1), 62–69. <https://doi.org/10.38001/ijlsb.693371>
19. Jhangiani, R. S., Chiang, I. A., Cuttler, C., & Leighton, D. C. (2019). *Research methods in Psychology*. Pressbooks. <https://doi.org/10.17605/OSF.IO/HF7DQ>
20. Jiang, S., Zheng, B., Ding, W., Lv, L., Ji, J., Zhang, H., Xiao, Y., & Li, L. (2012). Whole-genome sequence of *Staphylococcus hominis*, an opportunistic pathogen. *Journal of bacteriology*, 194(17), 4761–4762. <https://doi.org/10.1128/JB.00991-12>
21. *Journal of Clinical and Health Sciences*. (2019). A comparative analysis of traditional and commercial deodorants: Examining antibacterial efficacy of alum and apple cider vinegar. 7(1), 15–27.
22. Karadağ, A., Demirci, B., Çaşkurlu, A., Demirci, F., Okur, M., Orak, D., Sipahi, H., & Başer, K. (2019). In vitro antibacterial, antioxidant, anti-inflammatory and analgesic evaluation of *Rosmarinus officinalis* L. flower extract fractions. *South African Journal of Botany*, 125, 214–220. <https://doi.org/10.1016/j.sajb.2019.07.039>
23. Khasanova, S. R., Plekhanova, T. I., Gashimova, D. T., & Galiakhmetova, E. K. (2021). In vitro antibacterial and antioxidant activity of *Rosmarinus officinalis*. *E3S Web of Conferences*, 285, 05012. https://www.e3s-conferences.org/articles/e3sconf/pdf/2021/61/e3sconf_abr2021_05012.pdf
24. Kenton, W. (2024, July 30). What is analysis of variance (ANOVA)? Investopedia. <https://www.investopedia.com/terms/a/anova.asp>
25. Koc, S., Ozdemir, O., Ozgen, S., & Kan, Y. (2015). Antimicrobial and antioxidant activities of rosemary extracts from Turkey. *Asian Pacific Journal of Tropical Biomedicine*, 5(8), 651–655. <https://doi.org/10.1016/j.apjtb.2015.04.005>
26. Mitro, S., Gordon, A. R., Olsson, M. J., & Lundström, J. N. (2012). The Smell of Age: Perception and discrimination of body odors of different ages. *PLoS ONE*, 7(5), e38110. <https://doi.org/10.1371/journal.pone.0038110>
27. Nakagawa, S., Hillebrand, G. G., & Nunez, G. (2020). *Rosmarinus officinalis* L. (Rosemary) Extracts Containing Carnosic Acid and Carnosol are Potent Quorum Sensing Inhibitors of *Staphylococcus aureus* Virulence. *Antibiotics*, 9(4), 149. <https://doi.org/10.3390/antibiotics9040149>
28. Nanda, A., Mohapatra, B. B., Mahapatra, A. P. K., Mahapatra, A. P. K., & Mahapatra, A. P. K. (2021). Multiple comparison test by Tukey's honestly significant difference (HSD): Do the confident level control type I error. *International Journal of Statistics and Applied Mathematics*, 6(1), 59–65. <https://doi.org/10.22271/math.2021.v6.i1a.636>
29. Naskar, A., Lee, S., & Kim, K. (2020). Easy One-Pot Low-Temperature Synthesized Ag-ZnO Nanoparticles and Their Activity Against Clinical Isolates of Methicillin-Resistant *Staphylococcus aureus*. *Frontiers in Bioengineering and Biotechnology*, 8. <https://doi.org/10.3389/fbioe.2020.00216>
30. Nieto, G., Ros, G., & Castillo, J. (2018). Antioxidant and antimicrobial properties of rosemary (*Rosmarinus officinalis*, L.): A review. *Medicines*, 5(3), 98. <https://doi.org/10.3390/medicines5030098>
31. Notes, M. L. (2024). *Staphylococcus hominis*: Introduction, Morphology, Pathogenicity, Lab Diagnosis, Treatment, Prevention, and Keynotes. *Medical Notes*. <https://medicallabnotes.com/staphylococcus-hominis-introduction-morphology-pathogenicity-lab-diagnosis-treatment-prevention-and-keynotes/>
32. O'Neill, R. (2020). 'Glow from the inside out': Deliciously Ella and the politics of 'healthy eating.' *European Journal of Cultural Studies*, 24(6), 1282–1303. <https://doi.org/10.1177/1367549420921868>
33. Ousaaïd, D., Laaroussi, H., Bakour, M., Ennaji, H., Lyoussi, B., & El Arabi, I. (2021). Antifungal and antibacterial activities of apple vinegar of different cultivars. *International Journal of Microbiology*, 2021, Article 6087671. <https://doi.org/10.1155/2021/6087671>
34. Penn Medicine. (2019, June 6). Is your deodorant or antiperspirant safe? Penn Medicine. <https://www.pennmedicine.org/updates/blogs/health-and-wellness/2019/june/deodorant>
35. Professional, C. C. M. (2025, February 7). Body odor. Cleveland Clinic. <https://my.clevelandclinic.org/health/symptoms/17865-body-odor>
36. Ranson, H. G. (2020). Chemical investigation of bacterial interactions involving phatogens. <https://doi.org/10.23860/diss-grant-ranson-hilary-2020>

37. Renbarger, R., & Morgan, G. (2018). Posttest-Only Control Group design. The SAGE Encyclopedia of Educational Research, Measurement, and Evaluation. <https://doi.org/10.4135/9781506326139.n530>
38. Sales, A.J., & Pashazadeh, M. (2020). Study of Chemical Composition and Antimicrobial Properties of Rosemary (*Rosmarinus officinalis*) Essential Oil on *Staphylococcus aureus* and *Escherichia coli* In Vitro. International Journal of Life Sciences and Biotechnology, 3(1), 62-69. <https://doi.org/10.38001/ijlsb.693371>
39. Salkind, N. J. (Ed.) (2010). Content Validity. In N. J. Salkind (Ed.), Encyclopedia of Research Design (pp. 501-503). SAGE Publications. <https://doi.org/10.4135/9781412961288.n74>
40. Sapkota, A. (2022, May 3). *Staphylococcus hominis*- An Overview - Microbe Notes. Microbe Notes. https://microbenotes.com/staphylococcus-hominis/?need_sec_link=1&sec_link_scene=im
41. Shah, H. A., Syed, A., Bhat, M. A., Kakru, D. K., Farooq, S., Qureshi, S., Shafi, A., Nabi, B., & Taku, A. (2023). Genomic Determinants and Antimicrobial Resistance Pattern of Clinical Isolates of Extended Spectrum Beta Lactamase (ESBL) Producing *Escherichia coli*. Journal of Pure and Applied Microbiology, 17(3), 1679–1690. <https://doi.org/10.22207/jpam.17.3.32>
42. Sienkiewicz, M., Łysakowska, M., Pastuszka, M., Bienias, W., & Kowalczyk, E. (2013). The potential of use Basil and rosemary essential oils as effective antibacterial agents. Molecules, 18(8), 9334–9351. <https://doi.org/10.3390/molecules18089334>
43. Sovacool, B. K., Griffiths, S., Kim, J., & Bazilian, M. (2021). Climate change and industrial F-gases: A critical and systematic review of developments, sociotechnical systems and policy options for reducing synthetic greenhouse gas emissions. Renewable and Sustainable Energy Reviews, 141, 110759. <https://doi.org/10.1016/j.rser.2021.110759>
44. Starbuck, C. (2023). Descriptive statistics. In Springer eBooks (pp. 97–120). https://doi.org/10.1007/978-3-031-28674-2_7
45. Thiengsusuk, A., Chaijaroenkul, W., & Na-Bangchang, K. (2013). Antimalarial activities of medicinal plants and herbal formulations used in Thai traditional medicine. Parasitology Research, 112(4), 1475–1481. <https://doi.org/10.1007/s00436-013-3294-6>

Appendix A

Approval Letter



COR JESU COLLEGE, INC.

Sacred Heart Avenue, Digos City, Province of Davao del Sur, Philippines
Tel. No. : (082) 553-2433 local 101 • Fax No. : (082) 553-2333 • www.cjc.edu.ph

January 29, 2025

Ara Ramea D. Amahan, RMT
Chief Medical Technologist
Laboratory Department
Digos Doctors Hospital,

We, Senior High School students from Cor Jesu College, Inc. are presently conducting a research paper entitled “Effectiveness of rosemary (*Salvia rosmarinus* Spenn.) oil as a cream to eliminate body odor causing bacteria” which is a partial fulfillment for requirements in Practical Research 2. We request permission to conduct a study involving the testing and storage of bacteria samples using Mueller-Hinton Agar. All information will be kept strictly confidential.

We would appreciate it if you could let us know your laboratory’s availability as soon as possible, ideally on or around January 31, 2025. However, we are flexible and can adapt to your schedule. Please let us know what dates work best for you. For further inquiries, please contact 09208028806.

Thank you very much and God bless.

Ours sincerely,

ARDIENTE, ELIAKIM JUSTIN L.
ASEGURADO, VAN LLYOD D.
CALUMPONG, MYKHAELA
ORILLO, RAINIER ANGELO L.
PONES, LAVIGNE KATE
ROJO, CHRISTINE EUNICE B.
TANQUECO, ALZHEA H.

Appendix B

SPSS Results

Descriptive Statistics

Treatments	Zone of Inhibition (in mm)			Mean	SD	Description
	R1	R2	R3			
T1	11	7	15	11.00	4.00	Resistant
T2	9	8	20	12.33	6.66	Resistant
T3	13	14	16	14.33	1.53	Moderate

ANOVA ZOI

	Sum of Squares	df	Mean Square	F	p	Decision
Between Groups	371.583	3	123.861	7.906	0.009	Reject H_o
Within Groups	125.333	8	15.667			(Significant)
Total	496.917	11				

Multiple Comparison

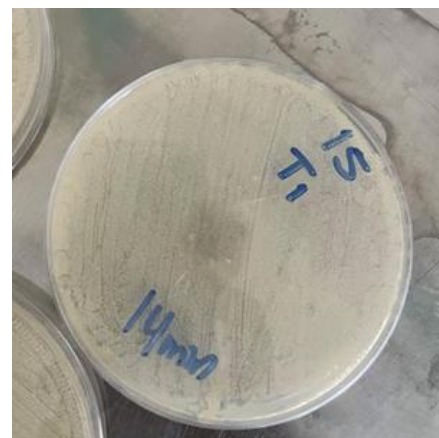
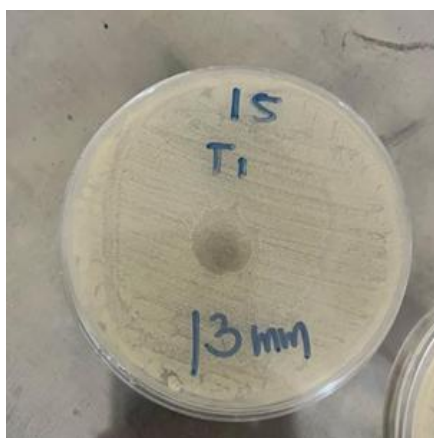
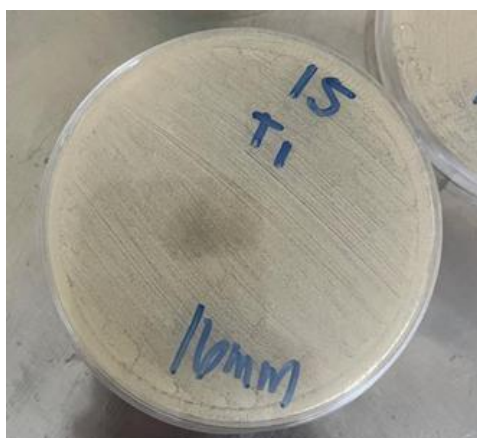
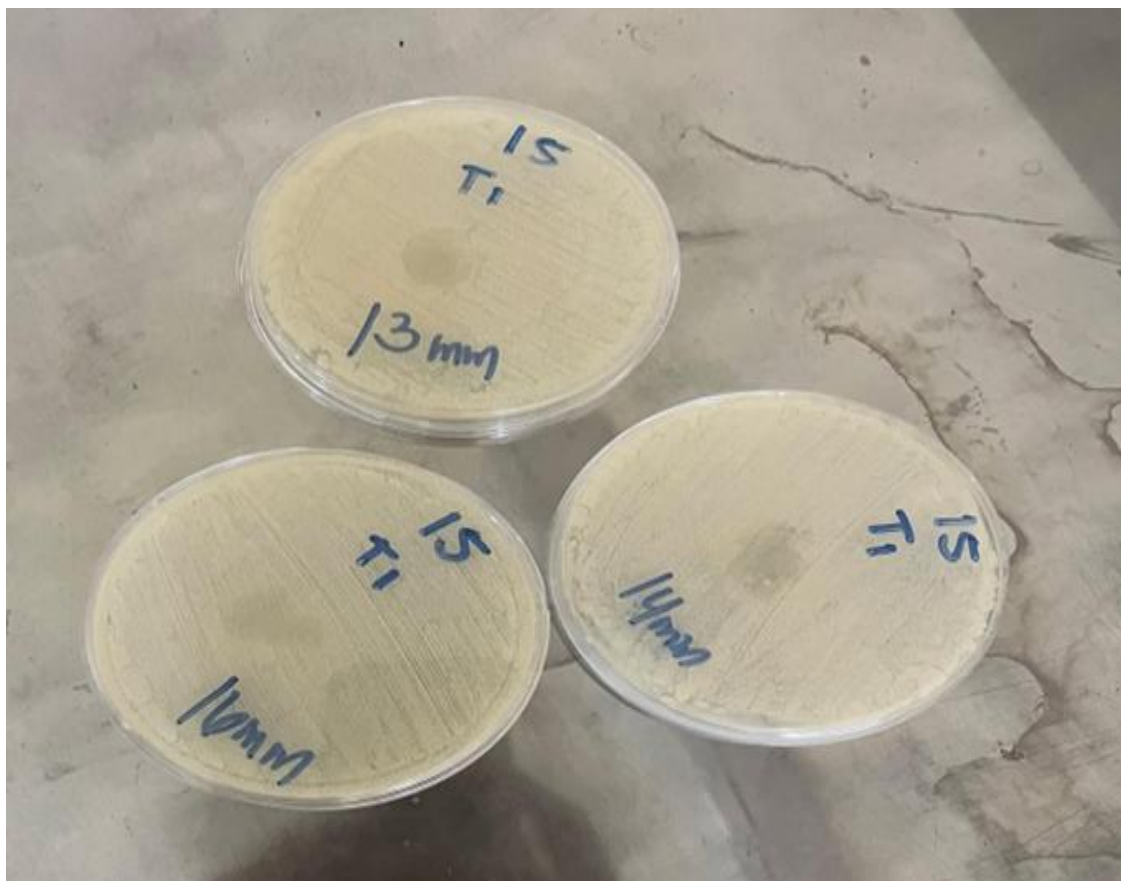
Post Hoc Comparisons using the Tukey HSD Test

	Mean Difference	p	Decision	Interpretation
Between T1 and T2	-1.333	0.975	Fail to Reject H_o	Not Significant
Between T1 and T3	-3.333	0.737	Fail to Reject H_o	Not Significant
Between T1 and Control	11.000	0.038	Reject H_o	Significant
Between T2 and T3	-2.000	0.923	Fail to Reject H_o	Not Significant
Between T2 and Control	12.333	0.021	Reject H_o	Significant
Between T3 and Control	14.333	0.009	Reject H_o	Significant

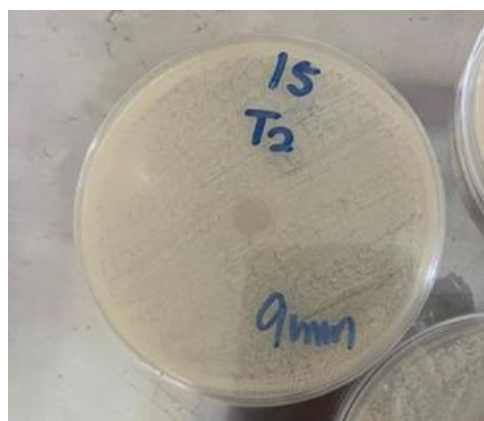
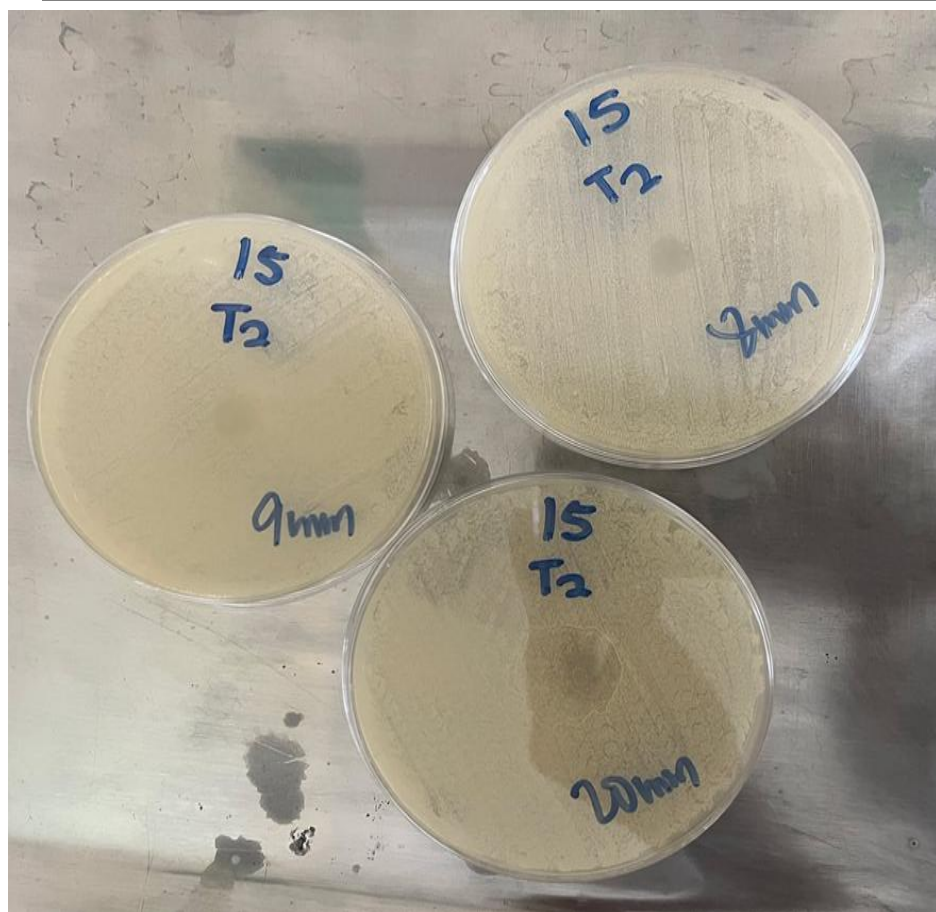
Appendix C

Captured Zone of Inhibition from Experimental Group and Controlled Group

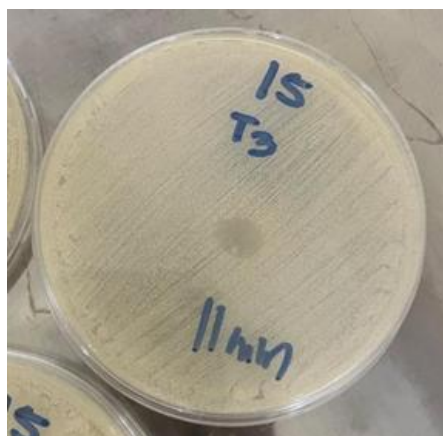
Experimental Group Results




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Appendix D

CURRICULUM VITAE



PERSONAL BACKGROUND

Name : Alzhea H. Tanqueco
Birth Date : September 6, 2007
Birth Place : Digos City, Davao del Sur
Address : Miyako Street, Nakayama Village,
Digos City, Davao del Sur
Civil Status : Single
Religion : Roman Catholic
Parents : Alejandro O. Tanqueco Jr.
Hazel H. Tanqueco

EDUCATIONAL BACKGROUND

Elementary : Apolinar Franco Sr. Elementary School,
Santa Cruz, Davao del Sur
With Distinction
Junior High School : Cor Jesu College, Inc.
Sacred Heart Avenue, Digos City
With Distinction
Senior High School : Cor Jesu College, Inc.
Sacred Heart Avenue, Digos City
With Distinction