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# ASSESSMENT OF CRUDE ETHANOLIC LAKATAN *(Musa acuminata)* BANANA PEEL EXTRACT AS A POTENTIAL CLINICAL LABORATORY DISINFECTANT COMPONENT

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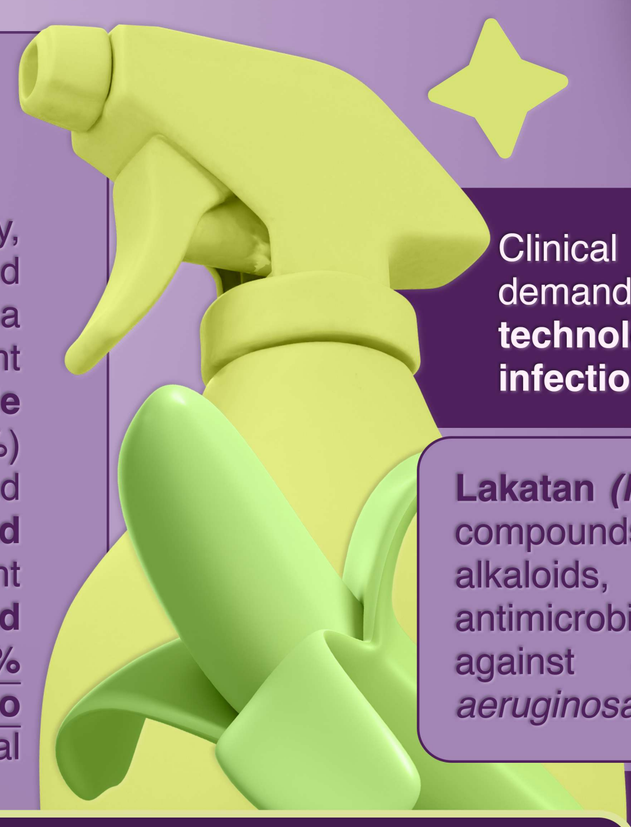
REFERENCES

## ABSTRACT

Disinfectants play a role in ensuring safety in the laboratory, but **frequent exposure poses a risk on human health** and the environment. The study explored the potential of banana peels *(Musa acuminata)* as a natural disinfectant component alternative to 10% sodium hypochlorite (NaOCl). **Crude ethanolic banana peel extracts (CEBPE)** (70%, 80%, 90%) were prepared through **digestion and evaporation**, and characterized using **Ultra-Performance Liquid Chromatography (UPLC).** Antimicrobial and disinfectant efficacy were tested through **disk diffusion and modified Kelsey-Sykes method.** Results showed that **80% and 90% CEBPE** exhibited antimicrobial properties **comparable to 10% NaOCl**, indicating CEBPE's potential as a natural alternative disinfectant.

*Keywords: banana peels, Musa acuminata, crude ethanolic extract, disinfectant, clinical laboratory, antimicrobial*



## INTRODUCTION

Clinical laboratories in the Philippines face increasing demand, highlighting the **vital role of medical technologists** who are **constantly exposed to infectious agents and hazardous chemicals.**

**Lakatan *(Musa acuminata)* banana peels** contain bioactive compounds—phenolic acids, flavonoids, tannins, terpenes, alkaloids, glycosides, and phytosterols—known for antimicrobial properties. These have shown strong activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa.*

**Ethanol-based wet digestion** under acidic conditions yields effective extracts. The crude ethanolic banana peel extract (CEBPE) is non-toxic, making it safe and environmentally friendly.

## OBJECTIVE

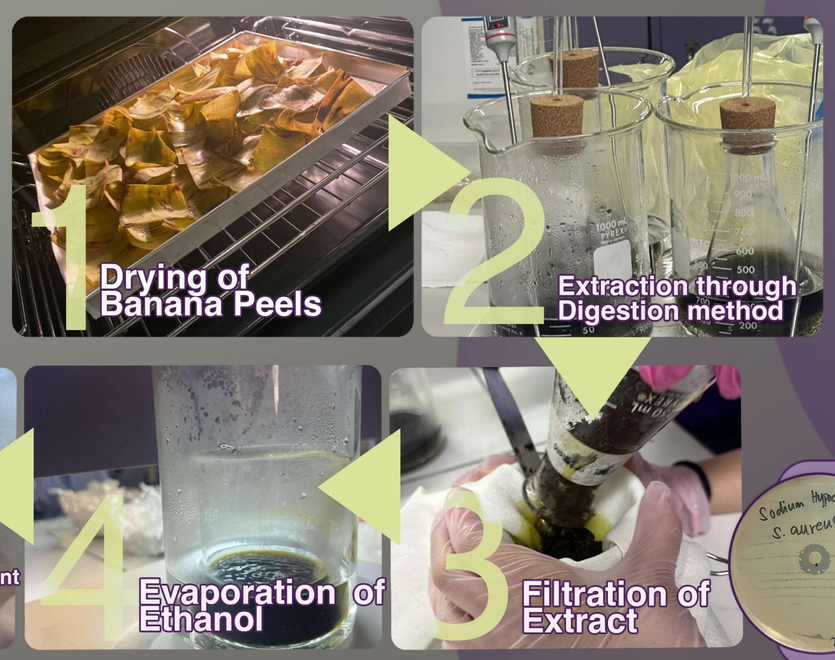
**To evaluate the antimicrobial efficacy of CEBPE compared to 10% sodium hypochlorite, assessing its potential as a safer, sustainable disinfectant component for clinical laboratories.**

## RESEARCH FLOWCHART

**PRE-EXPERIMENTAL**

Acquisition and Authentication of Banana Species → Acquisition of Ethanol → Crude Ethanolic Extraction of Banana Peel (Extraction and Digestion → Phytochemical Analysis of Total Flavonoid Content (UPLC) → **EXPERIMENTAL** → Preparations of the Different Concentrations of CEBPE (70%, 80%, 90%) → Kirby Bauer Disk Diffusion Test and Modified Kelsey-Sykes Test → **POST-EXPERIMENTAL** → Analysis and Interpretation of Results → Determination of Viability of CEBPE as an alternative disinfectant component

## METHODS




## RESULTS & DISCUSSION

**Table 1. Results of Susceptibility of *S. aureus* and *P. aeruginosa* to sodium hypochlorite, DMSO, and CEBPE concentrations**

| Bacterial Isolate | Disinfectant/Control | Zone of Inhibition |
|---|---|---|
| *P. aeruginosa* | 10% NaOCl | 15.0 mm |
| | 10% DMSO | 0 mm |
| | 70% CEBPE | 0 mm, 0 mm, 7.2 mm |
| | 80% CEBPE | 16 mm, 16 mm, 16.1 mm |
| | 90% CEBPE | 0 mm, 17.6 mm, 14 mm |
| *S. aureus* | 10% NaOCl | 16.1 mm |
| | 10% DMSO | 0 mm |
| | 70% CEBPE | 0 mm, 9.7 mm, 10.2 mm |
| | 80% CEBPE | 0 mm, 0 mm, 0 mm |
| | 90% CEBPE | 0 mm, 7 mm, 7.3 mm |

Note. NaOCl = Sodium hypochlorite; DMSO = Dimethyl Sulfoxide; CEBPE = Crude ethanolic banana peel extract.

Table 1 shows that at 70%, CEBPE showed minimal activity against *S. aureus* and weak inhibition of *P. aeruginosa*. At 80%, it showed strong inhibition of *S. aureus* but none for *P. aeruginosa*.

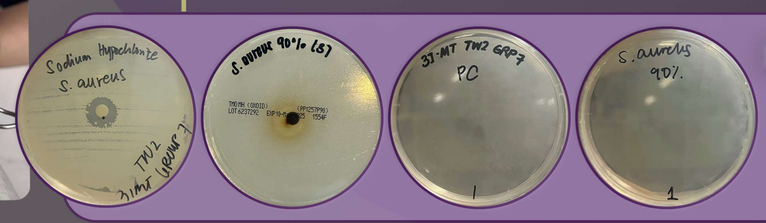



**Figure 7. Kirby Bauer for *S. aureus* at 90% CEBPE**

Comparison between the 90% CEBPE and 10% NaOCl shows that the 90% CEBPE performs as well as the 10% NaOCl (p = 0.452)

## CONCLUSION

**The study found that CEBPE at 90% concentration was as effective as 10% sodium hypochlorite against *Staphylococcus aureus*. For *Pseudomonas aeruginosa*, CEBPE at both 80% and 90% showed comparable antimicrobial activity to sodium hypochlorite. These findings indicate that CEBPE, particularly at higher concentrations, holds potential as a natural alternative to conventional disinfectants.**

## RECOMMENDATIONS

- Future research should assess the biodegradability of CEBPE to ensure no environmental harm, including irritation and toxicity tests, to the safety of the extract for users.
- Additionally, corrosive analysis is recommended to test the compatibility of CEBPE with laboratory equipment.
- Moreover, improving extraction methods for a higher yield of the extract.
- For future Kelsey-Sykes tests, larger volumes may provide more accurate results, and implementing the Minimum Inhibitory Concentration (MIC).
- For more precise measurements of antimicrobial effectiveness, Minimum Bacterial Concentration can be applied.

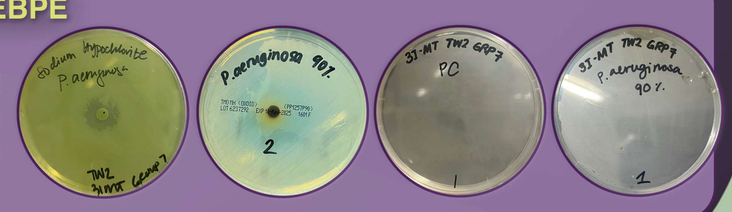



**Figure 9. Kirby Bauer for *P. aeruginosa* at 90% CEBPE**

The 10% NaOCl demonstrated consistently strong antimicrobial activity in comparison with the different concentrations of CEBPE. However, 80% and 90% CEBPE showed potential as effective disinfectant, as both passed the Kelsey-Sykes test.

**Table 8. Efficacy of CEBPE Concentration as a Potential Clinical Disinfectant Component**

| Bacterial Isolate | Disinfectant/Control | Challenge 1 | Challenge 2 | Challenge 3 | Results |
|---|---|---|---|---|---|
| *P. aeruginosa* | 10% NaOCl | - | - | + | PASS |
| | 70% CEBPE | + | + | + | FAIL |
| | 80% CEBPE | + | - | + | FAIL |
| | 90% CEBPE | - | - | - | PASS |
| *S. aureus* | 10% NaOCl | - | - | - | PASS |
| | 70% CEBPE | - | + | + | FAIL |
| | 80% CEBPE | - | - | - | PASS |
| | 90% CEBPE | - | - | + | PASS |

Note. (-) = No growth; (+) = Growth

The Kelsey Sykes Method result showed that the 90% CEBPE is effective against *S. aureus*, while the 80% and 90% CEBPE is effective against *P. aeruginosa*.