

Antibacterial Activity of *Syzygium aromaticum*.L Leaf Essential Oil Against *Staphylococcus aureus* ATCC 25923

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INTRODUCTION

Syzygium aromaticum L., known as clove, had been widely used for many purposes and was rich in potent natural drug compounds. Currently, the flowers of the plant have been commercialized as a drug and food preservative, but not their leaves. Exploring natural resources is important to get new potent but economically friendly drugs, such as natural antibiotics. Clove leaf essential oil has many natural compounds promising to develop as a novel antibacterial agent (Sukohar et al, 2022). Previous studies have shown that eugenol is the main component of cloves that has antibacterial activity (Ode et al, 2023)



OBJECTIVE

This study aimed to determine the active compound and investigate the antibacterial activity of clove leaf essential oil against *Staphylococcus aureus* ATCC 25923.

METHODOLOGY



Clove leaf essential oil was extracted from the leaves by distillation process

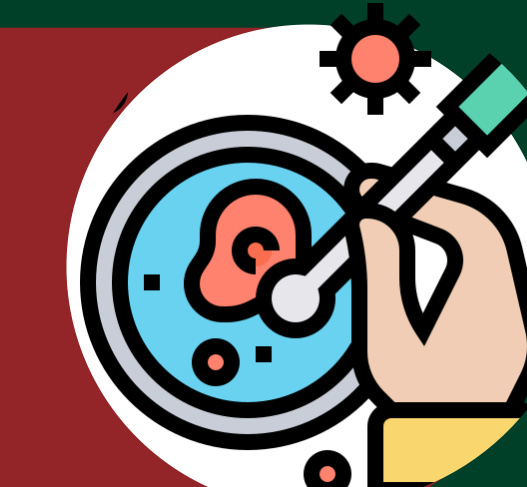
Clove leaf essential oil was made in several concentrations: 50%; 25%; 12.5%; 6.25% and 3.125%, with 1% dimethyl sulfoxide as a negative control, and 0.1% ampicillin as a positive control



Screening of phytochemical compounds using Gas Chromatography-Mass Spectrometry

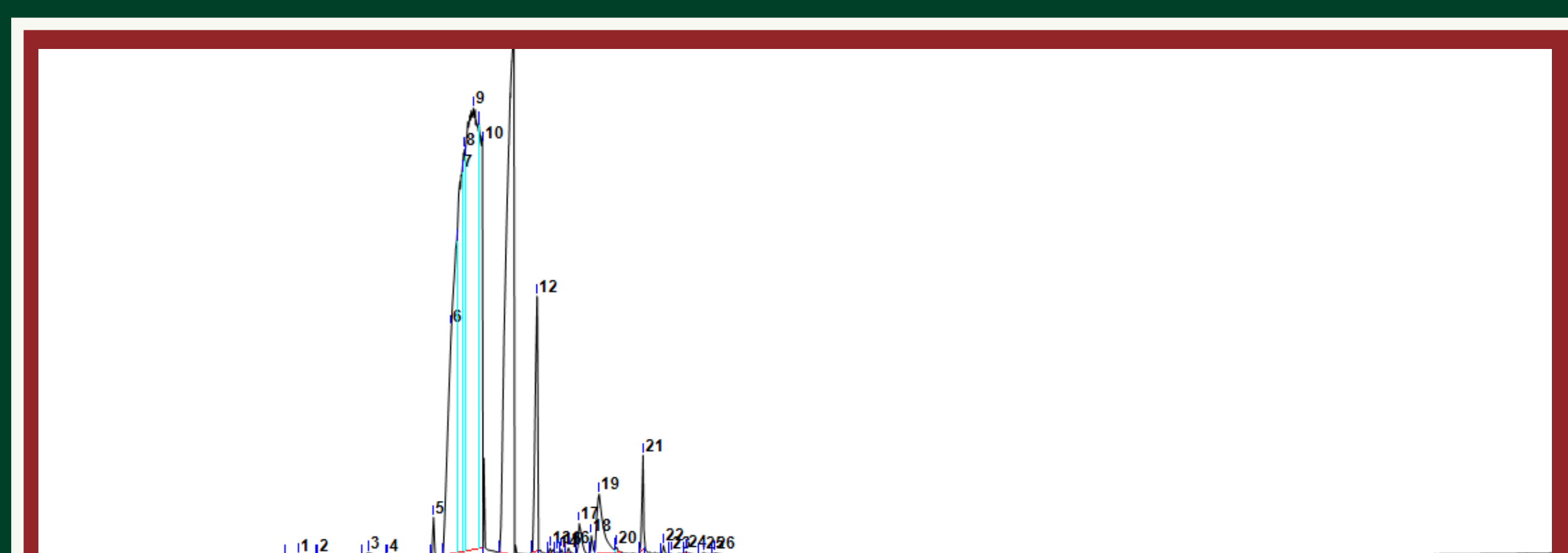


Antibacterial test of essential oils against *Staphylococcus aureus* ATCC 25923 bacteria using the disc diffusion method

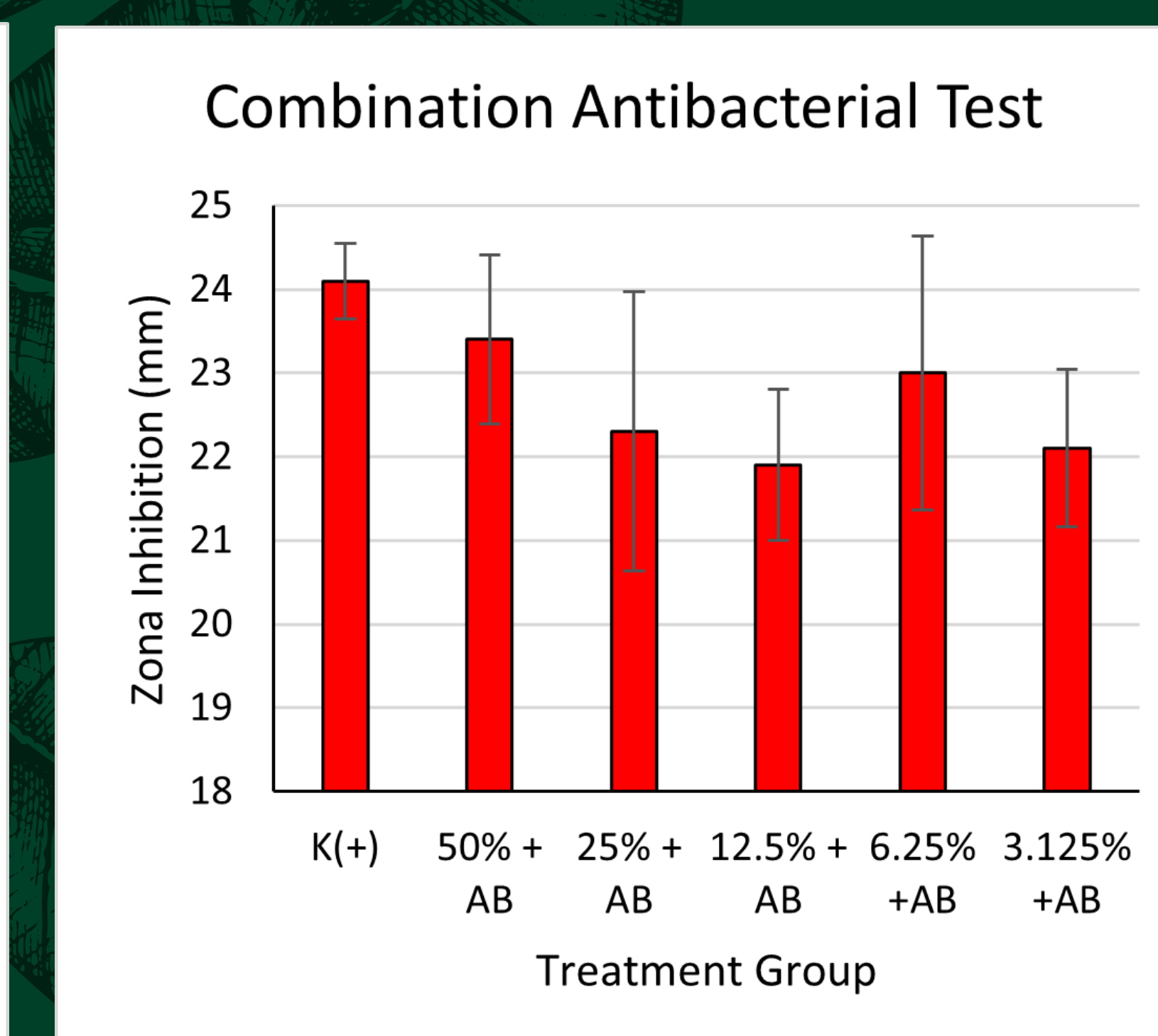
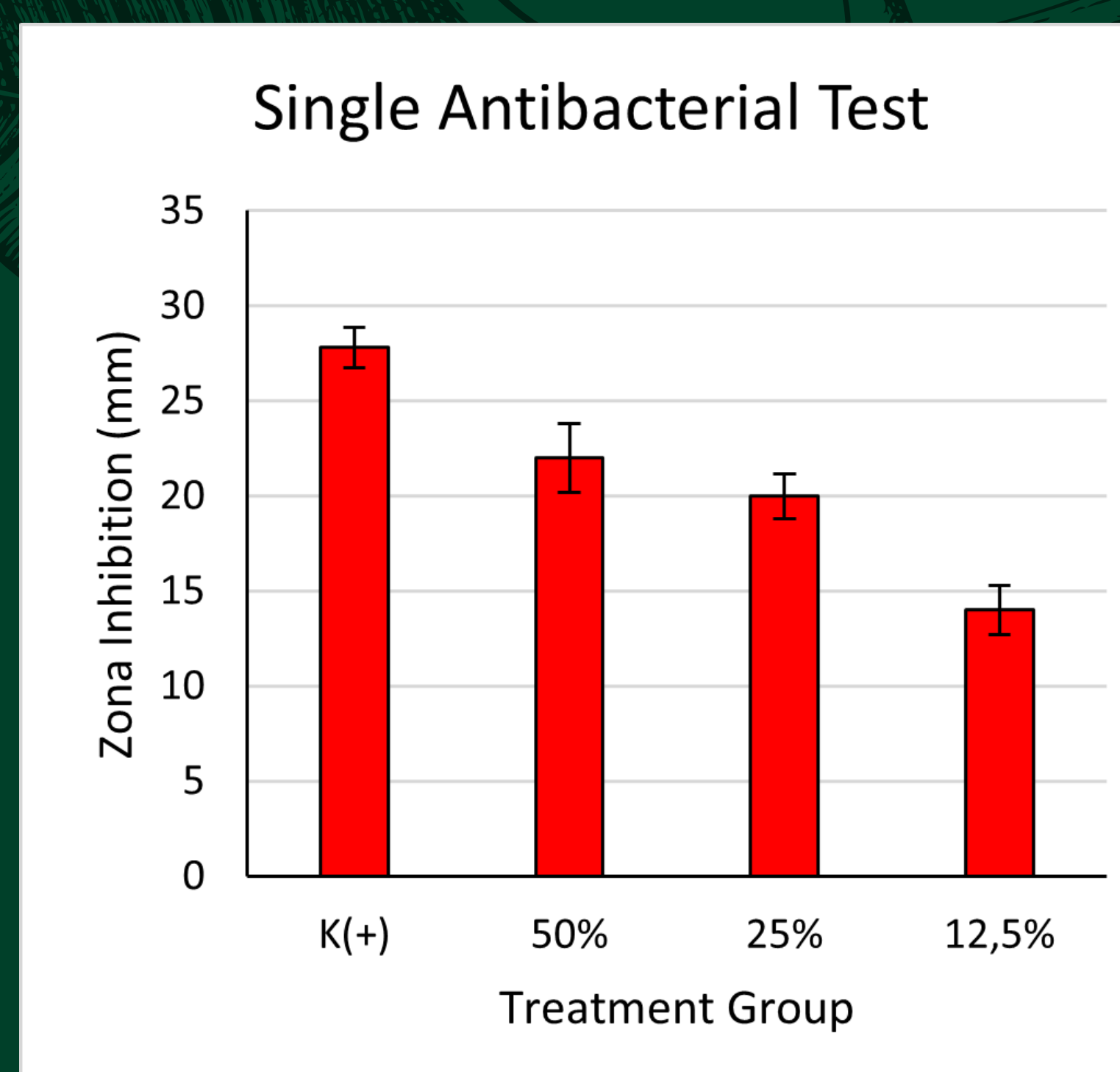


RESULT

- The phytochemical study showed 26 peaks. Clove leaf essential oil contains mostly Eugenol (36,76%), 3-Allyl-6-methoxyphenol (30,67%), and Caryophyllene (23,89%).



| Compound | % Content | Structure |
|-------------------------|-----------|--------------------------------------|
| Eugenol | 36.75% | <chem>CC=Cc1ccc(OC)c(O)c1</chem> |
| 3-Allyl-6-methoxyphenol | 30.67% | <chem>CC=Cc1cc(OC)c(O)cc1</chem> |
| Caryophyllene | 23.89% | <chem>CC1=C(C)CC2=C(C1)C(C)C2</chem> |



- The antibacterial activity assay showed that the highest concentration of essential oil, which is 50%, had an inhibition zone diameter of 22 mm. Meanwhile, the concentration of 25 and 12.5% showed their activity with a zone inhibition diameter of 20 and 14 mm, respectively.
- As the main component of clove leaf essential oils, eugenol plays an important role in antibacterial activity because of its ability to damage bacterial cell membranes (Ulanowska & Olas, 2021).
- The combination of ampicillin and essential oil showed no significant increase in inhibition zone diameter, explaining that the combination was not synergistic.

CONCLUSION

This study revealed that clove leaf essential oil is promising to develop as a new antibacterial agent due to its potent activity against *Staphylococcus aureus* ATCC 25923.

REFERENCES

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- Ulanowska & Ulas. 2021. Biological Properties and Prospects for the Application of Eugenol—A Review. *Int. J. Mol. Sci.* 2021, 22, 3671