

ABSTRACT

Antibacterial Activity Test of the Combination of Ethanol Extracts of Moringa Leaves (*Moringa oleifera*) and Red Ginger Rhizomes (*Zingiber officinale* var. *rubrum*) Against *Salmonella typhi* In Vitro

By

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Background: Typhoid fever is an infectious disease caused by *Salmonella typhi* and remains a public health problem. The increasing incidence of antibiotic resistance has encouraged the exploration of alternative antibacterial agents derived from natural products. Moringa leaves (*Moringa oleifera*) and red ginger rhizome (*Zingiber officinale* var. *rubrum*) are known to contain secondary metabolites with potential antibacterial properties.

Methods: This study was an experimental laboratory research. Extraction of moringa leaves and red ginger rhizome was carried out using the maceration method with 96% ethanol as the solvent. Antibacterial activity against *Salmonella typhi* was evaluated using the dilution method to determine the Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC), as well as the agar well diffusion method to observe the diameter of inhibition zones.

Results: The results showed that all tested concentrations of moringa leaf and red ginger ethanolic extracts still exhibited bacterial growth in the dilution assay, indicating that MIC and MBC values could not be determined. In the agar well diffusion assay, both single extracts and their combinations did not produce inhibition zones against *Salmonella typhi*.

Conclusions: : The ethanolic extracts of Moringa leaves (*Moringa oleifera*) and red ginger rhizomes (*Zingiber officinale* var. *rubrum*), as well as their combination, did not demonstrate antibacterial activity against *Salmonella typhi* under the conditions of this study.

Keywords: Moringa Leaf, Red Ginger, *Salmonella typhi*, Antibacterial Activity, Agar Well Diffusion

ABSTRAK

UJI AKTIVITAS ANTIBAKTERI KOMBINASI EKSTRAK ETANOL DAUN KELOR (*Moringa oleifera*) DAN EKSTRAK ETANOL RIMPANG JAHE MERAH TERHADAP *Salmonella typhi* SECARA *IN VITRO*

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Latar Belakang: Demam tifoid merupakan penyakit infeksi yang disebabkan oleh *Salmonella typhi* dan masih menjadi permasalahan kesehatan masyarakat. Meningkatnya resistensi antibiotik mendorong pencarian sumber antibakteri alternatif dari bahan alam. Daun kelor (*Moringa oleifera*) dan rimpang jahe merah (*Zingiber officinale* var. *rubrum*) diketahui mengandung senyawa metabolit sekunder yang berpotensi memiliki aktivitas antibakteri.

Metode: Penelitian ini merupakan penelitian eksperimental laboratorium. Ekstraksi daun kelor dan rimpang jahe merah dilakukan dengan metode maserasi menggunakan pelarut etanol 96%. Uji aktivitas antibakteri terhadap *Salmonella typhi* dilakukan menggunakan metode dilusi untuk menentukan Konsentrasi Hambat Minimum (KHM) dan Konsentrasi Bunuh Minimum (KBM), serta metode difusi sumuran untuk mengamati diameter zona hambat.

Hasil: Hasil penelitian menunjukkan bahwa seluruh konsentrasi ekstrak etanol daun kelor dan rimpang jahe merah masih memperlihatkan pertumbuhan bakteri pada uji dilusi sehingga nilai KHM dan KBM tidak dapat ditentukan. Pada uji difusi sumuran, ekstrak tunggal maupun kombinasi tidak membentuk zona hambat terhadap *Salmonella typhi*.

Kesimpulan: Ekstrak etanol daun kelor dan rimpang jahe merah serta kombinasi keduanya tidak menunjukkan aktivitas antibakteri terhadap *Salmonella typhi* pada kondisi penelitian ini.

Kata Kunci: Daun kelor, Jahe Merah, *Salmonella typhi*, Antibakteri, Difusi Sumuran