

UNIVERSITAS PEMBANGUNAN NASIONAL “VETERAN” JAKARTA

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SAYIDAH ALFIAH ZIAUR RAHMAH, 2210211103

**ISOLASI BAKTERI RIZOSFER TANAH KELOR (*Moringa Oleifera*)
SEBAGAI SUMBER ANTIOKSIDAN POTENSIAL DALAM
PENDEKATAN PREVENTIF DIABETES MELITUS TIPE 2**

RINCIAN HALAMAN (xiii+94 halaman, 7 tabel, 8 gambar, 3 bagan, 2 grafik, 8 lampiran)

ABSTRAK

Bakteri rizosfer berpotensi menghasilkan metabolit bioaktif, termasuk antioksidan. Stres oksidatif berperan dalam patogenesis Diabetes Melitus Tipe 2 (DMT2), sehingga eksplorasi sumber antioksidan alami relevan dalam pendekatan preventif. Penelitian ini mengeksplorasi potensi bakteri rizosfer tanah kelor (*Moringa oleifera*) sebagai sumber antioksidan potensial terkait stres oksidatif pada DMT2. **Tujuan:** Mengetahui potensi bakteri rizosfer tanah kelor (*Moringa oleifera*) sebagai sumber antioksidan potensial dalam pendekatan preventif DMT2 melalui pengujian aktivitas antioksidan *in vitro*. **Metode:** Penelitian eksperimental deskriptif. Isolasi bakteri rizosfer dilakukan dengan kultur pada Nutrient Agar hingga diperoleh isolat murni. Karakterisasi fenotip awal meliputi morfologi koloni dan sel, pewarnaan Gram, serta uji katalase. Isolat terpilih difermentasi dalam Nutrient Broth, kemudian metabolit diekstraksi menggunakan *Ultrasound Assisted Extraction* (UAE). Aktivitas antioksidan diuji menggunakan metode DPPH dengan vitamin C sebagai kontrol positif. Data disajikan sebagai rata-rata persentase inhibisi. **Hasil:** Diperoleh tiga isolat dengan variasi fenotip awal: dua isolat Gram positif (kokus dan basil) dan satu isolat Gram negatif (kokobasil); seluruh isolat menunjukkan katalase positif. Uji DPPH pada metabolit isolat terpilih menunjukkan aktivitas antioksidan pada konsentrasi 20%, 40%, 60%, dan 80%, dengan inhibisi tertinggi pada konsentrasi 40% sebesar 45,4%. Pola konsentrasi–aktivitas tidak linier dan inhibisi maksimum belum mencapai 50%. **Kesimpulan:** Bakteri rizosfer tanah kelor menunjukkan potensi awal sebagai sumber metabolit dengan aktivitas antioksidan secara *in vitro* sebagai indikator awal potensi antioksidan terkait stres oksidatif dalam pendekatan preventif DMT2.

Daftar Pustaka : [110, 2016-2025]

Kata Kunci: Antioksidan; bakteri rizosfer; DMT2; DPPH; *Moringa oleifera*; *Ultrasound-Assisted Extraction* (UAE).

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SAYIDAH ALFIAH ZIAUR RAHMAH

**ISOLATION OF RHIZOSPHERIC BACTERIA FROM *Moringa oleifera*
SOIL AS A POTENTIAL SOURCE OF ANTIOXIDANTS IN A
PREVENTIVE APPROACH TO TYPE 2 DIABETES MELLITUS**

DETAILED PAGES (xiii+93 pages, 7 tables, 8 figures, 3 diagrams, 2 graphs, 8 appendices)

ABSTRACT

Rhizospheric bacteria are known to produce bioactive metabolites, including antioxidant compounds. Oxidative stress plays an important role in the pathogenesis of Type 2 Diabetes Mellitus (T2DM), making the exploration of natural antioxidant sources relevant within a preventive approach. This study explores the potential of rhizospheric bacteria isolated from *Moringa oleifera* soil as a source of antioxidant compounds related to oxidative stress in T2DM. **Objective:** To assess the potential of rhizospheric bacteria from *Moringa oleifera* soil as a source of antioxidant activity within a preventive approach to Type 2 Diabetes Mellitus through *in vitro* evaluation. **Methods:** This study employed a descriptive experimental design. Rhizospheric bacteria were isolated using culture methods on Nutrient Agar to obtain pure isolates. Preliminary phenotypic characterization was conducted based on colony and cell morphology, Gram staining, and catalase testing. A selected isolate was fermented in Nutrient Broth, and metabolites were extracted using *Ultrasound-Assisted Extraction* (UAE). Antioxidant activity was evaluated *in vitro* using the DPPH assay, with vitamin C as a positive control. Data were analyzed descriptively and presented as mean percentage inhibition. **Results:** Three rhizospheric bacterial isolates with distinct phenotypic characteristics were obtained, including two Gram-positive isolates (cocci and bacilli) and one Gram-negative isolate (*coccobacillus*). All isolates showed positive catalase activity. The DPPH assay demonstrated antioxidant activity of the fermented metabolite extract at all tested concentrations (20%, 40%, 60%, and 80%), with the highest inhibition observed at 40% concentration (45.4%). The concentration–activity relationship was non-linear, and maximum inhibition did not reach 50%. **Conclusion:** Rhizospheric bacteria isolated from *Moringa oleifera* soil exhibit preliminary *in vitro* antioxidant activity, serving as an initial indicator of antioxidant potential related to oxidative stress within a preventive approach to Type 2 Diabetes Mellitus. Further studies are required to confirm and develop this potential.

References: [110, 2016-2025]

Keywords: Antioxidant; DPPH; *Moringa oleifera*; rhizospheric bacteria; T2DM; *Ultrasound-Assisted Extraction* (UAE).