

INTISARI

Matrix Metalloproteinase-9 (MMP-9) merupakan protein yang diekspresikan tinggi pada penderita kanker payudara stadium III, khususnya jenis *triple negative*. Permasalahan utamanya adalah kurangnya selektivitas obat pada target terapi dan timbulnya efek samping serta ketidaknyamanan penderita pada saat terapi. Penelitian sebelumnya menemukan bahwa ekstrak metanol daun kamboja putih (*Plumeria alba* L.) aktif menghambat MMP-9 secara *in vitro* ($IC_{50} = 24,06 \mu\text{g/mL}$) yang dipilih berdasarkan uji *in silico docking* terhadap PEX-9. Penelitian kali ini bertujuan untuk menemukan fraksi aktif dari ekstrak metanol daun kamboja putih berpandukan uji aktivitas *in vitro* terhadap penghambatan MMP-9.

Fraksinasi dilakukan menggunakan kromatografi kolom fase normal dengan fase gerak *n*-heksana-etil asetat (2 $\frac{1}{2}$:1 $\frac{1}{2}$). Fraksi yang diperoleh diidentifikasi menggunakan kromatografi lapis tipis. Uji *in vitro* MMP-9 dilakukan dengan prinsip *fluorescence resonance energy transfer* (FRET) based MMP-9.

Hasil uji menunjukkan persen penghambatan aktivitas MMP-9 oleh partisi etil asetat sebesar 75% pada konsentrasi 1000 $\mu\text{g/mL}$, sedangkan pada partisi air di bawah 50%, dan partisi *n*-heksana tidak ada persentase penghambatan terhadap MMP-9. Fraksi etil asetat 2 dan 3 menunjukkan persen penghambatan sebesar 98% dan 97% pada konsentrasi yang sama, sehingga memiliki potensi sebagai kandidat obat kanker payudara *triple negative*.

Kata kunci: *Plumeria alba* L., kanker payudara, *triple negative*, MMP-9, uji *in vitro*

ABSTRACT

Matrix metalloproteinase-9 (MMP-9) is the highly expressed protein in patients with stage III cancer, including the triple-negative type. The important issues herein are the lack of drug selectivity at the target of therapy, the emergence of side effects, and the discomfort of therapy. Previous research indicated that the methanolic extract of White Frangipani (*Plumeria alba* L.) leaves actively inhibited MMP-9 *in vitro* (IC₅₀=24.06 µg/mL) which was selected using *in silico* docking test against PEX-9. The present study aims to find the active fraction of methanolic extracts of White Frangipani (*Plumeria alba* L.) leaves followed by an *in vitro* assay against MMP-9 inhibition.

The fractionation was carried out using normal phase chromatography with *n*-hexane-ethyl acetate (2½: 1½) as the mobile phase. The fraction obtained was then identified using thin-layer chromatography. The MMP-9 *in vitro* assay was performed with the principle of MMP-9-based *fluorescence-based resonance energy transfer* (FRET).

The results showed that the percentage of inhibition of MMP-9 activity by ethyl acetate partition was 75% at 1000 µg/mL concentration, whereas there were no inhibition against MMP-9 in the aqueous partition below 50% and *n*-hexane partition. The ethyl acetate fractions of 2 and 3 showed 98% and 97% inhibition of the same concentration, respectively, thus possessing them as the potential drug candidates for triple-negative breast cancer.

Keywords: *Plumeria alba* L., breast cancer, triple-negative cancers, MMP-9, *in vitro*