UJI INHIBISI ENZIM LIPASE EKSTRAK ETANOL DAUN KELOR (*Moringa oleifera* L.) DENGAN METODE EKSTRAKSI ULTRASONIK SEBAGAI KANDIDAT ANTIOBESITAS SECARA *IN VITRO*

Zahra Fikriya

Abstrak

Obesitas merupakan suatu kondisi kelebihan berat badan akibat ketidakseimbangan antara asupan dan pengeluaran energi. Orlistat adalah satu-satunya antiobesitas dengan cara kerja menghambat enzim lipase, namun memiliki efek samping seperti komplikasi gastrointestinal, maka diperlukan terapi alternatif yang lebih aman. Daun kelor (*Moringa oleifera*) berpotensi menghambat enzim lipase karena mengandung senyawa fitokimia berupa flavonoid, fenolik, alkaloid, saponin, dan terpenoid. Daun kelor diekstraksi dengan etanol 50% melalui ekstraksi ultrasonik dengan variasi frekuensi 30 kHz, 40 kHz, dan 50 kHz. Uji kadar fenolik total pada tiap ekstrak dilakukan dengan reagen Folin-Ciocalteu, sedangkan uji kadar flavonoid total dilakukan dengan reagen CH_3COONa dan $AlCl_3$. Pengujian inhibisi enzim lipase dilakukan secara *in vitro* dengan spektrofotometri *visible* menggunakan substrat *p-Nitrophenyl Butyrate* (p-NPB) dan diukur pada panjang gelombang 405 nm. Ekstrak dengan frekuensi 30 kHz, 40 kHz, dan 50 kHz memiliki aktivitas inhibisi enzim lipase, dengan hasil persentase inhibisi tertinggi sebesar 54,1197% diperoleh dari ekstrak dengan frekuensi 40 kHz pada konsentrasi 12500 ppm. Tidak terdapat perbedaan signifikan pada persentase inhibisi dari ketiga variasi frekuensi ekstraksi (Sig>0,05).

Kata Kunci: daun kelor, ekstraksi ultrasonik, enzim lipase, obesitas

IN VITRO LIPASE INHIBITION ASSAY OF KELOR (*Moringa oleifera* L.) LEAVES ETHANOLIC EXTRACT USING ULTRASOUND ASSISTED EXTRACTION AS A POTENTIAL ANTIOBESITY

Zahra Fikriya

Abstract

Obesity is characterized by excessive body weight due to a disproportion between energy intake and expenditure. Orlistat is the only anti-obesity drug that works by inhibiting the lipase enzyme, however, it has side effects such as gastrointestinal complications, necessitating safer alternative therapies. Kelor leaves (*Moringa oleifera*) have the potential as a lipase enzyme inhibitor due to its phytochemical content, including flavonoids, phenolics, alkaloids, saponins, and terpenoids. The leaves were extracted using 50% ethanol with ultrasonic extraction at varying frequencies of 30 kHz, 40 kHz, and 50 kHz. The total phenolic content in each extract was tested using the Folin-Ciocalteu reagent, while the total flavonoid content was tested with CH3COONa and AlCl3 reagents. Lipase enzyme inhibition was tested in vitro using visible spectrophotometry with the substrate p-Nitrophenyl Butyrate (p-NPB) and measured at 405 nm. Extracts at frequencies of 30 kHz, 40 kHz, and 50 kHz show lipase enzyme inhibition activity, with the highest inhibition of 54.1197% from the extract at 40 kHz frequency at a concentration of 12500 ppm. There are no significant differences in inhibition percentages among the three extraction frequencies (Sig>0.05).

Keywords: lipase enzyme, *Moringa oleifera* leaves, obesity, ultrasonic extraction