

INTISARI

Penuaan kulit dapat disebabkan oleh faktor intrinsik yang merupakan proses penuaan yang berlangsung secara alami dan faktor ekstrinsik disebabkan oleh pengaruh lingkungan seperti sinar matahari, udara, zat kimia dan lingkungan sekitar. Paparan sinar matahari terutama radiasi UV B dapat menghasilkan radikal bebas dan *Reactive Oxygen Spesies* (ROS). Pembentukan ROS yang melebihi kemampuan sistem pertahanan antioksidan pada sel target dapat memicu stres oksidatif serta dapat merusak biomolekul secara oksidatif seperti DNA dan membran lipid, sehingga memicu melanogenesis. Fukosantin dari rumput laut coklat telah dilaporkan menekan ekspresi *Messenger Ribonucleic Acid* (mRNA) kulit yang berhubungan dengan melanogenesis, mengurangi faktor melanogenesis pada tingkat transkripsi.

Penelitian ini bertujuan untuk mengetahui aktivitas antioksidan rumput laut coklat (*P. australis*) serta aktivitasnya untuk agen anti penuaan dini meliputi uji penghambatan terhadap enzim tirosinase, enzim kolagenase dan enzim elastase. Uji kualitatif dilakukan dengan pemeriksaan organoleptis, uji susut pengeringan dan KLT dengan pembanding fukosantin, sedangkan uji kuantitatif menggunakan Kromatografi Cair Kinerja Tinggi (KCKT). Pengukuran aktivitas antioksidan dilakukan dengan metode *Beta Caroten Bleaching* (BCB) dan metode *Ferric Reducing Antioxidant Power* (FRAP). Penghambatan Elastase dan kolagenase diukur menggunakan *drug discovery kit* (*Neutrophil elastase Colorimetric* dan MMP-1, Colorimetri) mengikuti protokol dalam Enzo Life Science. Aktivitas antimelanogenik diuji melalui penghambatan enzim tirosinase.

Ekstrak etanol *P. australis* (EPA) yang larut dalam etil asetat mengandung fukosantin $11,6 \pm 0,56$ µg/ml, mempunyai aktivitas antioksidan metode FRAP sebesar $7,42$ µmol Fe^{2+} /g sampel sedangkan fraksi hasil kolom *P. australis* (FPA) mempunyai aktivitas antioksidan sebesar $7,21$ µmol Fe^{2+} /g sampel. Ekstrak etanol *P. australis* (EPA) dan fraksi hasil kolom *P. australis* (FPA) mempunyai kemampuan untuk pemucatan betakaroten (*Betacaroten Bleaching*) masing-masing sebesar IC_{50} $54,93 \pm 2,34$ µg/mL (ekstrak) dan $49,50 \pm 5,25$ µg/mL (Fraksi). Untuk uji penuaan dini dengan aktivitas penghambatan enzim kolagenase untuk ekstrak etanol *P. australis* (EPA) kadar 40 ppm sebesar $93,89 \pm 1,05$ %, kadar 80 ppm sebesar $93,61 \pm 1,88$ % dan Fraksi hasil kolom *P. australis* (FPA) kadar 40 ppm sebesar $95,42 \pm 0,42$ %, untuk kadar 80 ppm sebesar $91,25 \pm 4,17$ %. Uji penghambatan elastase menghasilkan aktivitas inhibitor sebesar $32,88 \pm 4,06$ % (ekstrak etanol 40 ppm) dan $23,64 \pm 3,63$ % untuk (ekstrak etanol 80 ppm), sedangkan fraksi 40 ppm dan fraksi 80 ppm sebesar masing-masing $25,08 \pm 2,78$ % dan $10,01 \pm 6,14$ %. Nilai IC_{50} penghambatan tirosinase adalah $431,67 \pm 115,21$ µg/mL (Kojic acid), $209,26 \pm 27,62$ µg/mL (Ekstrak etanol *P. australis*) dan $353,49 \pm 80,97$ µg/mL (Fraksi hasil kolom *P. australis*).

Kata Kunci: *Padina australis*, fukosantin, antioksidan, anti penuaan dini

ABSTRACT

Skin aging can be caused by the intrinsic factor is the aging process that happens naturally and by the extrinsic factors due to environmental influences such as sunlight, air, chemicals and environment. Exposure to sunlight, especially UVB radiation can produce free radicals and reactive oxygen species (ROS). ROS formation that exceeds the ability of the antioxidant defense system in target cells can trigger oxidative stress and oxidative damage biomolecules such as DNA and lipid membranes that trigger melanogenesis. Fucoxantin from brown seaweed has been reported to suppress the expression of Messenger Ribonucleic Acid (mRNA) associated with skin melanogenesis, reducing melanogenesis factor at the level of transcription.

This study aims to determine the antioxidant activity of brown seaweed *Padina australis* species and activities for anti-aging agents include tests matrices metalloproteinase inhibition of the enzyme, collagenase, and elastase. Qualitative test has been conducted by organoleptic inspection, follow by test the drying shrinkage and TLC experiment with fukosantin as a standard, while the quantitative test conducted using High Performance Liquid Chromatography (HPLC). Antioxidant activity measured by the method of Beta carotene bleaching (BCB) and the method of Ferric Reducing Antioxidant Power (FRAP). Inhibition of elastase and collagenase were measured using the drug discovery kit (Colorimetric Neutrophil elastase and MMP-1, colorimetri) in accordance with protocol in Enzo Life Science. Activities of antimelanogenic was tested through inhibition of the enzyme tyrosinase.

P. australis extract containing fucoxantin $11.6 \pm 0.56 \mu\text{g/mL}$, FRAP methods have antioxidant activity of $7.42 \mu\text{mol Fe}^{2+}/\text{g}$ sample, while the fraction of *P. australis* has antioxidant activity of $7.21 \mu\text{mol Fe}^{2+}/\text{g}$ sample. The ethanolic extract (EPA) and the fraction of *P. australis* (FPA) have the ability in bleaching of beta-carotene (Betacaroten Bleaching) of IC_{50} $54.93 \pm 2.34 \mu\text{g/mL}$ (extract) and $49.50 \pm 5.25 \mu\text{g/mL}$ (fractions). Ethanolic extract (EPA) in concentration of 40 ppm and 80 ppm have collagenase inhibitory activity of $93.89 \pm 1.05 \%$ and $93.61 \pm 1.88 \%$, respectively while Fraction of *P. australis* showed collagenase inhibitory activity of $95.42 \pm 0.42 \%$ and $91.25 \pm 4.17 \%$, respectively for concentration of 40 ppm and 80 ppm. The elastase inhibition activity of ethanolic extract (EPA) and fraction of *P. australis* (FPA) in concentration 40 ppm $32.88 \pm 4.06 \%$ and $25.08 \pm 2.78 \%$, respectively while in concentration 80 ppm the result showed that the elastase inhibition activity were $23.64 \pm 3.63 \%$ (EPA) and $10.01 \pm 6.14 \%$ (FPA). The IC_{50} value of tyrosinase inhibition test were $431.67 \pm 115.21 \mu\text{g/mL}$, $209.26 \pm 27.62 \mu\text{g/mL}$ and $353.49 \pm 80.97 \mu\text{g/mL}$, respectively for kojic acid as a standard, ethanolic extract (EPA) and fraction of *P. australis* (FPA).

Keywords: *Padina australis*, fucoxantin, antioxidant, anti-aging