

## INTISARI

*Reactive Oxygen Species* ROS dapat meningkatkan kadar enzim kolagenase (MMP-1) dan meningkatkan aktivitas enzim elastase yang mengakibatkan kenaikan degradasi kolagen penyebab pengerutan kulit. Fukosantin telah terbukti memiliki sifat *photoprotective* di sel fibroblas manusia melalui penghambatan kerusakan DNA dan meningkatkan aktivitas antioksidan sehingga mempunyai efek anti penuaan dini. Fukosantin banyak terkandung dalam rumput laut coklat seperti *Turbinaria decurrens*. Penelitian ini bertujuan mengetahui aktivitas antioksidan dan anti penuaan dini *Turbinaria decurrens*. Aktivitas antioksidan ditetapkan dengan metode *Betacaroten Bleaching* (BCB) dan *Ferric Reducing Antioxidant Power* (FRAP). Sedangkan anti penuaan dini ditetapkan dengan menguji aktivitas penghambatan terhadap enzim tirosinase, elastase dan kolagenase (MMP-1).

Simplisia *Turbinaria decurrens* dimaserasi dengan menggunakan etanol 96% selama 8 hari. Maserat dievaporasi sehingga didapatkan ekstrak kental. Sebagian dari ekstrak kental difraksinasi menggunakan kromatografi kolom, hasil fraksi di evaporasi didapatkan fraksi kental. Kedua sediaan tersebut kemudian diuji kualitatif menggunakan KLT dan kuantitatif menggunakan HPLC. Aktivitas antioksidan diuji dengan metode *betacaroten bleaching* (BCB) dan *ferric reducing antioxidant power* (FRAP). Pengujian anti penuaan dini menggunakan metode aktivitas penghambatan enzim kolagenase, elastase dan tirosinase. Bahan pengujian enzim berasal dari Discovery Drug Kit dari Enzo Life Science. Analisis statistik menggunakan *one-way analysis of variance* (ANOVA) dilanjutkan dengan uji *post hoc* Tukey.

Hasil penelitian menunjukkan bahwa aktivitas antioksidan ekstrak dan fraksi *T. decurrens* dengan metode BCB memiliki  $IC_{50}$  sebesar  $63,75 \pm 4,087$   $\mu\text{g/ml}$  (ekstrak),  $57,75 \pm 0,44$   $\mu\text{g/ml}$  (fraksi), sedangkan pengujian dengan metode FRAP sebesar  $161,67 \pm 3,22$   $\mu\text{mol/g}$  ekstrak dan  $105,50 \pm 16,73$   $\mu\text{mol/g}$  fraksi. Pada uji anti penuaan dini untuk metode penghambatan kolagenase ekstrak dan fraksi *T. decurrens* mampu menghambat aktivitas enzim kolagenase secara signifikan dibanding inhibitor NNGH ( $p > 0,05$ ) dengan kemampuan berturut-turut sebesar  $96,22 \pm 1,22\%$  (ekstrak 40  $\mu\text{g/mL}$ ),  $93,51 \pm 0,75\%$  (ekstrak 80  $\mu\text{g/mL}$ ),  $93,52 \pm 1,77\%$  (Fraksi 40  $\mu\text{g/mL}$ ),  $94,81 \pm 2,09\%$  (fraksi 80  $\mu\text{g/mL}$ ), sedangkan ekstrak dan fraksi *T. decurrens* mampu menghambat aktivitas enzim elastase (*Human Neutrophil Elastase*) lebih baik dibanding kontrol inhibitor Elastatinal sebesar berturut-turut untuk ekstrak 40  $\mu\text{g/ml}$  sebesar  $65,50 \pm 8,7\%$ , ekstrak 80  $\mu\text{g/ml}$  sebesar  $66,857 \pm 1,5\%$ , fraksi 40  $\mu\text{g/ml}$  sebesar  $76,66 \pm 0,94\%$ , fraksi 80  $\mu\text{g/ml}$  sebesar  $52,74 \pm 8,45\%$ . Pengujian dengan metode penghambatan tirosinase memiliki  $IC_{50}$  sebesar  $130,46 \pm 8,5$   $\mu\text{g/ml}$  (ekstrak) dan  $138,66 \pm 9,7$   $\mu\text{g/ml}$  (fraksi). Hasil penelitian ini dapat disimpulkan bahwa ekstrak dan fraksi *T. decurrens* efektif sebagai antioksidan dengan metode BCB dan FRAP dan efektif sebagai anti penuaan dini dengan menghambat aktivitas enzim tirosinase, kolagenase (MMP-1) dan elastase.

Kata Kunci: *Turbinaria decurrens*, fukosantin, antioksidan, anti penuaan dini

## ABSTRACT

### STUDY ANTIOXIDANT AND ANTI-AGING ACTIVITIES OF BROWN SEAWEED (*Turbinaria decurrens*)

Reactive Oxygen Species ROS can increase levels of the enzyme collagenase (MMP-1) and increasing the activity of the enzyme elastase which results in increased degradation of collagen cause wrinkling of the skin. Fucoxanthin been shown to have *photoprotective* properties in human fibroblast cells by inhibiting DNA damage and increases the activity of antioxidants that have anti-aging effects. Fucoxanthin is contained in brown seaweed like *Turbinaria decurrens*. This study aims to determine the activity of antioxidant and anti-aging *Turbinaria decurrens*. Antioxidant activity was determined by the method *Betacaroten Bleaching* (BCB) and *Ferric Reducing Antioxidant Power* (FRAP). While anti-aging determined by testing the inhibitory activity against tyrosinase enzyme, elastase and collagenase (MMP-1).

*Turbinaria decurrens* powder macerated using 96% ethanol for 8 days. Maserat evaporated to obtain a thick extract. A portion of the condensed extract was fractionated using column chromatography fractions in the result obtained fractions condensed evaporated. Both preparations were then tested using qualitative and quantitative TLC using HPLC. The antioxidant activity was tested by the method betacaroten bleaching (BCB) and ferric reducing antioxidant power (FRAP). Testing anti-aging method inhibitory activity of enzymes collagenase, elastase and tyrosinase. Materials testing of enzymes derived from Drug Discovery Kit from Enzo Life Science. Statistical analysis using one-way analysis of variance (ANOVA) followed by post hoc Tukey test.

The results showed that the antioxidant activity of extracts and fractions *T. decurrens* with BCB methods have  $IC_{50}$  of  $4.087 \pm 63.75$  pg / ml (extract),  $57.75 \pm 0.44$  pg / ml (fraction), while testing with FRAP method of  $161.67 \pm 3.22$  mol / g extract and  $105.50 \pm 16.73$  mol / g fractions. In anti-aging test for inhibition of collagenase method extracts and fractions *T. decurrens* capable of inhibiting the enzyme activity of collagenase significantly compared NNGH inhibitor ( $p > 0.05$ ) with the ability to successively equal to  $96.22 \pm 1.22\%$  (Extract 40 mg / mL),  $93.51 \pm 0.75\%$  (extract 80 mg/mL),  $93.52 \pm 1.77\%$  (fraction 40 mg / mL),  $94.81 \pm 2.09\%$  (fraction 80 mg/mL), while extracts and fractions *T. decurrens* able to inhibit the activity of the enzyme elastase (Human Neutrophile elastase) is better than control inhibitor of consecutive Elastatinal to extract 40 ug / mL for  $65.50 \pm 8.7\%$ , extract of 80 ug / mL amounted to  $66.857 \pm 1.5\%$ , the fraction of 40 ug/ml  $76.66 \pm 0.94\%$ , the fraction of 80 ug / mL of  $52.74 \pm 8.45\%$ . Testing by the method of inhibition of tyrosinase have  $IC_{50}$  of  $130.46 \pm 8.5$  µg / ml (extract) and  $138.66 \pm 9.7$  µg / ml (fraction). The results of this study can be concluded that extracts and fractions *T. decurrens* effective as an antioxidant by BCB and FRAP methods and effective as an anti-aging by inhibiting the activity of tyrosinase enzyme, collagenase (MMP-1) and elastase.

Keywords: *Turbinaria decurrens*, fucoxanthin, antioxidants, anti-aging.