

ABSTRAK

Tanaman akuatik merupakan sumber peptida bioaktif yang berpotensi dan dapat dimanfaatkan oleh manusia, namun penelitian mengenai kandungannya masih sangat terbatas. Salah satu aktivitas bioaktif yang dapat ditemui pada tanaman akuatik adalah inhibitor ACE. Aktivitas inhibitor ACE memiliki dampak positif untuk menurunkan tekanan darah dalam tubuh melalui berbagai mekanisme, sehingga mengurangi potensi penyakit hipertensi. Melalui penelitian ini, pendugaan terhadap varian peptida bioaktif dengan aktivitas inhibitor ACE pada makroalga *Ulva lactuca* dilakukan melalui serangkaian teknik *in silico* yang diantaranya *multiple sequence alignment* (MSA), ADMET, *molecular docking*, dan teori densitas fungsional (TDF). Sumber protein *Rubisco*, *ATP Synthase Subunit β* , dan *50S Ribosomal Protein* digunakan pada penelitian ini. *Ulva lactuca* memiliki potensi kehadiran aktivitas inhibitor ACE yang dapat bersaing dengan sumber tanaman terestrial *Zea mays*. Lima varian peptida bioaktif inhibitor ACE yaitu AY, FG, IY, LQ, dan VY dinilai unggul melalui serangkaian pengujian *in silico*. Perlakuan pemotongan oleh enzim *thermolysin* juga diduga berpotensi menghasilkan varian peptida bioaktif unggul. Selain aktivitas inhibitor ACE, peptida bioaktif unggul juga memiliki aktivitas antioksidan secara teoritis yang keduanya dinilai penting dalam mengurangi resiko hingga penanganan penyakit hipertensi.

Kata kunci: hipertensi, inhibitor ACE, *in silico*, peptida bioaktif, *Ulva lactuca*

ABSTRACT

*Marine plants are a potential source of bioactive peptides that can be utilized by humans, but research on their content is still very limited. One of the bioactive activities that can be found in marine plants is ACE inhibitor. The activity of ACE inhibitors has a positive impact on lowering blood pressure in the body through various mechanisms, thereby reducing the risks for hypertension. Through this study, the estimation of bioactive peptide variants with ACE inhibitory activity on the macroalgae *Ulva lactuca* was carried out through a series of *in silico* techniques including multiple sequence alignment (MSA), ADMET, molecular docking, and density functional theory (DFT). Rubisco protein, ATP Synthase Subunit β , and 50S Ribosomal Protein were used as protein source in this study. *Ulva lactuca* has the potential presence of ACE inhibitor activity that can compete with terrestrial plant sources *Zea mays*. Five variants of the ACE inhibitor bioactive peptide, namely AY, FG, IY, LQ, and VY were identified to be superior through a series of *in silico* tests. Enzyme treatment by *thermolysin* is also suspected to have the potential to produce superior bioactive peptide variants. In addition to the activity of ACE inhibitors, superior bioactive peptides also have theoretically antioxidant activity, both of which are considered important in reducing risk and managing hypertension.*

Keywords: ACE inhibitor, bioactive peptides, hypertension, in silico, Ulva lactuca