

ABSTRAK

Masalah resistensi antibiotik telah menjadi ancaman yang sangat serius terhadap kesehatan masyarakat karena menjadi penyebab besar peningkatan angka kematian, sehingga diperlukan alternatif pengganti antibiotik yang dianggap aman, salah satunya adalah peptida bioaktif antibakteri atau *Antimicrobial peptide* (AMP). Peptida bioaktif dapat dihasilkan dari proses hidrolisis enzimatis menggunakan enzim papain yang berasal dari ekstrak kasar daun pepaya kalifornia (*Carica papaya* L.) dan sumber protein berasal dari kacang kedelai (*Glycine max* (L.) Merr.) yang diolah menjadi susu kedelai. Tujuan penelitian ini adalah untuk mengetahui karakteristik enzim papain, mengetahui aktivitas antibakteri dari hidrolisat protein susu kedelai dan menganalisis berat molekul hidrolisat protein. Penelitian ini diawali dengan preparasi susu kedelai, pemisahan protein susu kedelai, ekstraksi dan karakterisasi enzim papain, hidrolisis protein, penentuan derajat hidrolisis, karakterisasi berat molekul dengan SDS-PAGE, serta uji aktivitas antibakteri terhadap *Staphylococcus aureus* dan *Escherichia coli* menggunakan metode difusi sumur. Berdasarkan penelitian ini kondisi optimum enzim papain berada pada konsentrasi substrat 2%, pH 7 dan suhu 55 °C. Hasil analisis berat molekul hidrolisat protein menunjukkan berat molekul protein 80 – 107 kDa sudah tidak terdapat lagi pada protein setelah hidrolisis karena diduga berubah menjadi protein dengan berat molekul yang lebih rendah yaitu 24-27 kDa dan <10 kDa. Hasil uji aktivitas antibakteri menunjukkan zona hambat tertinggi diperoleh hidrolisat protein 60 menit sebesar 7,608 mm terhadap bakteri *S.aereus* dan sebesar 8,058 mm terhadap bakteri *E.coli*.

Kata kunci : antibakteri, enzim papain, hidrolisat protein, SDS PAGE, susu kedelai

ABSTRACT

*The problem of antibiotic resistance has become a very serious threat to public health because it is a major cause of increased mortality. Therefore, alternatives to antibiotics are needed which are considered safe, one of which is Antimicrobial peptide (AMP). Bioactive peptides can be produced from an enzymatic hydrolysis process using the papain enzyme derived from the crude extract of kalifornia papaya leaves (*Carica papaya* L.) and the source of protein is obtained from soybeans (*Glycine max* (L.) Merr.) which are processed into soymilk. This research aimed to determine the characteristics of the papain enzyme, to determine the antibacterial activity of soymilk protein hydrolysate and to analyze the molecular weight of protein hydrolysate. This research is started with preparation of soymilk, extraction of soymilk protein, extraction and characterization of papain enzymes, protein hydrolysis, determination of the degree of hydrolysis, characterization of molecular weight with SDS-PAGE, and antibacterial activity test against *Staphylococcus aureus* and *Escherichia coli* using the well-diffusion method. Based on this research, the optimum conditions for the papain enzyme were at a substrate concentration of 2%, pH 7 and temperature 55°C. Analysis of the molecular weight of the protein hydrolyzate showed that the protein molecular weight of 80-107 kDa is no longer present in proteins after hydrolysis because it is thought to turn into a protein with a lower molecular weight of 24-27 kDa and <10 kDa. The results of the antibacterial activity test showed the highest inhibition zone on protein hydrolyzate 60 minutes of 7.608 mm against *S.aereus* and 8.058 mm against *E.coli*.*

Keywords: *antibacterial, papain enzyme, protein hydrolyzate, SDS PAGE, soymilk*