

**STUDI APLIKASI PROTEASE MIKROBIA *Bacillus cereus* TD5B UNTUK
MENINGKATKAN KEMAMPUAN PEPTIDA BIOAKTIF PROTEIN
DAGING DAN HATI ITIK LOKAL SEBAGAI AGEN ANTI HIPERTENSI**

INTISARI

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Penelitian ini bertujuan untuk mengeksplorasi potensi peptida bioaktif dari daging dan hati itik lokal Indonesia sebagai agen antihipertensi melalui penghambatan *angiotensin-converting enzyme* (ACE). Sampel yang digunakan adalah daging dan hati itik mojosari, magelang, pengging, turi, dan cirebon yang berumur 10 bulan dan jenis kelamin jantan. Hidrolisis protein menggunakan 0,1% (b/b) enzim protease dari *Bacillus cereus* strain TD5B, Pepsin, dan Tripsin. Parameter yang diamati meliputi konsentrasi protein, berat molekul protein, aktivitas inhibitor ACE, dan nilai IC_{50} ACE. Data konsentrasi protein dianalisis secara statistik menggunakan analisis variansi pola faktorial (5x3, 5 jenis itik dan 3 macam enzim), sedangkan data SDS-PAGE dan aktivitas penghambat ACE dianalisis secara deskriptif. Hasil penelitian menunjukkan bahwa konsentrasi kadar protein daging itik meningkat secara signifikan ($P < 0,05$) karena proses hidrolisis, dengan nilai kadar protein tertinggi setelah dimurnikan pada sampel daging itik turi yang dihidrolisis dengan pepsin sebesar $132,04 \pm 0,92$ mg/mL dan pada sampel hati itik bon yang dihidrolisis dengan enzim dari *B. cereus* TD5B sebesar $2,89 \pm 0,01$ mg/mL. Hasil analisis SDS-PAGE menunjukkan bahwa terdapat penurunan berat molekul protein daging dan hati itik akibat proses hidrolisis, dari 196,53 sampai 43,88 kDa ke 71,35 sampai 10,12 kDa. Hidrolisat protein daging dan hati itik memiliki aktivitas penghambat ACE antara 61,06% sampai 69,72% dengan nilai IC_{50} antara 46,50 μ g/mL sampai 159,35 μ g/mL. Aktivitas penghambatan ACE setelah dimurnikan terjadi peningkatan menjadi 80,91% sampai 87,10% dengan nilai IC_{50} antara 44,94 μ g/mL sampai 112,39 μ g/mL. Kesimpulan dari penelitian ini adalah protein hidrolisat daging dan hati itik yang dihidrolisis dengan enzim protease *B. cereus* TD5B, Pepsin, dan Tripsin memiliki potensi sebagai penghambat ACE dengan nilai penghambatan tertinggi pada sampel daging itik magelang yang dihidrolisis dengan tripsin sebesar $87,10 \pm 0,94\%$ dan pada sampel hati itik pengging yang dihidrolisis dengan pepsin sebesar $68,12 \pm 9,23\%$. Nilai IC_{50} terbaik dari sampel daging itik mojosari yang dihidrolisis dengan enzim *B. cereus* TD5B sebesar $44,94 \pm 1,08$ μ g/mL dan pada sampel hati itik turi yang dihidrolisis dengan pepsin sebesar $81,28 \pm 14,99$ μ g/mL.

Kata kunci: Purifikasi, Protease Mikrobia, *Bacillus cereus* TD5B Protein Daging Itik; Hidrolisis, Enzim Protease Mikrobia; Penghambatan ACE

STUDY PROTEASE APPLICATION OF *Bacillus cereus* TD5B TO INCREASE BIOACTIVE PEPTIDE ABILITY OF MEAT AND LIVER FROM LOCAL DUCKS AS AN ANTI HYPERTENSI AGENT

ABSTRACT

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This study aims to explore the potential of bioactive peptides from Indonesian local duck meat and liver as antihypertensive agents through inhibition of angiotensin-converting enzyme (ACE). The samples used were mojosari, magelang, pengging, turi, and cirebon duck meat and liver aged 10 months old and male sex. Protein hydrolysis using 0.1% (w/w) protease enzymes from *Bacillus cereus* TD5B, Pepsin, and Trypsin. The parameters observed included protein concentration, molecular weight of protein, ACE inhibitory activity, and IC₅₀ value from ACE. Protein concentration data were analyzed statistically using factorial analysis of variance (5.3, 5 kind of duck, 3 kind of enzyme), while SDS-PAGE data and ACE inhibitory activity were analyzed descriptively. The results showed that the soluble protein concentration of duck meat increased significantly ($P < 0.05$) due to the hydrolysis process, with the highest protein content value after purification in meat samples from turi ducks which were hydrolyzed by pepsin at 132.04 ± 0.92 mg/mL and liver samples from cirebon ducks which were hydrolyzed with enzymes from *B. cereus* TD5B 2.89 ± 0.01 mg/mL. The results of SDS-PAGE analysis showed that there was a decrease in molecular weight of meat and duck liver due to the hydrolysis process, from the range 196.53 to 43.88 kDa to the range 71.35 to 10.12 kDa. Meat and duck liver protein hydrolysates had ACE inhibitory activity ranging from 61.06% to 69.72% with IC₅₀ values ranging from 46.50 µg/mL to 159.35 µg/mL, after being purified, there was an increase of 80.91% to 87.10% with IC₅₀ values ranging from 44.94 µg/mL to 112.39 µg/mL. It can be concluded that the meat and liver hydrolyzate protein which were hydrolyzed with protease enzyme from *B. cereus* strain TD5B, Pepsin, and Trypsin had the potential as an ACE inhibitor with the highest inhibition value in meat samples from magelang ducks which were hydrolyzed with trypsin $87.10 \pm 0.94\%$ and in liver samples from pengging ducks that were hydrolyzed with pepsin $68.12 \pm 9.23\%$, while the best IC₅₀ values was from meat samples from mojosari ducks which were hydrolyzed with enzymes from *B. cereus* TD5B 44.94 ± 1.08 µg/mL and liver samples from turi ducks which were hydrolyzed with pepsin 81.28 ± 14.99 µg/mL.

Keywords: Microbial Protease, *Bacillus cereus* TD5B, Duck Meat Protein; Hydrolysis, ACE inhibitor

