

# Profil Protein *Klebsiella* sp. dalam Kondisi Cekaman Osmotik dan Keasaman

## Protein Profile of *Klebsiella* sp. under Osmotic and Acid Shock

Ali Ikhwan<sup>1\*</sup>, Triwibowo Yuwono<sup>2</sup>, dan Jaka Widada<sup>3</sup>

<sup>1</sup>Pusat Pengembangan Bioteknologi, Universitas Muhammadiyah Malang

<sup>2</sup>Laboratorium Mikrobiologi, Fakultas Pertanian, Universitas Gadjah Mada, Yogyakarta

<sup>3</sup>Laboratorium Mikrobiologi, Fakultas Pertanian, Universitas Gadjah Mada, Yogyakarta

E-mail: ikhwan\_umm@yahoo.com \*Penulis untuk korespondensi

### Abstract

A study has been conducted to determine the profile of proteins synthesised under osmotic and acid shock in *Klebsiella* sp. grown in minimal medium. Osmotic shock was mimicked by using NaCl, while acid shock was imposed by using aluminium sulphate. *Klebsiella* sp. was grown in minimal media supplemented with NaCl, or aluminium sulphate, as a single shock-imposing substance, or by using both substances to impose a double-shock effect. Total protein extracted from the cell was electrophoresed on SDS-PAGE 12%. Analysis demonstrated that several intracellular, membrane, or extracellular proteins were synthesised under specific shock condition. Under osmotic shock, an intracellular protein of 42.7 kDa, and a membrane protein of 53.3 kDa were synthesised. Acid shock, on the other hand, resulted in the synthesis of intracellular proteins of 54.7 kDa, 25.3 kDa, and 14.2 kDa, and a 43.9 kDa membrane protein, and extracellular proteins of 17–29 kDa. Under double shock condition, a specific intracellular protein of 26.7 kDa and a membrane protein of 61.1 kDa were detected. The synthesised proteins indicated a different correlation pattern among shock conditions imposed. Under osmotic shock, it was observed that correlation was positive towards the shock effect, while under double shock correlation was observed to be negative towards proteins, and under acid shock correlation did not demonstrate a clear pattern.

Key words: Osmotic shock, acid shock, *Klebsiella* sp., protein profile

### Abstrak

Penelitian dilakukan untuk mengetahui profil protein yang dibuat oleh *Klebsiella* sp. yang tumbuh dalam kondisi cekaman osmotik dan keasaman. Cekaman osmotik dilakukan menggunakan NaCl, sedangkan cekaman keasaman menggunakan aluminium sulfat. *Klebsiella* sp. ditumbuhkan dalam medium minimal yang ditambah dengan NaCl, atau aluminium sulfat, untuk menimbulkan efek cekaman tunggal, atau menggunakan kedua senyawa tersebut untuk menghasilkan efek cekaman ganda. Protein total yang diekstrak dari sel kemudian dielektroforesis pada SDS-PAGE 12%. Hasil analisis menunjukkan beberapa protein intraselular, protein membran, atau protein ekstraselular yang dibuat dalam kondisi cekaman spesifik. Dalam kondisi cekaman osmotik, dibuat protein intraselular berukuran 42,7 kDa, dan protein membran berukuran 53,3 kDa. Pada cekaman asam dihasilkan protein intraselular berukuran 54,7 kDa, 25,3 kDa, 14,2 kDa, dan satu protein membran berukuran 43,9 kDa, serta protein ekstraselular berukuran 17–29 kDa. Dalam kondisi cekaman ganda, terdeteksi satu protein intraselular spesifik berukuran 26,7 kDa dan satu protein membran berukuran 61,1 kDa. Dalam cekaman osmotik, diketahui terdapat korelasi positif, sedangkan dalam cekaman ganda terdapat korelasi negatif terhadap macam protein. Dalam cekaman keasaman, tidak diperoleh pola korelasi yang spesifik.

Kata kunci: Cekaman osmotik, cekaman keasaman, *Klebsiella* sp., profil protein