

ABSTRAK

Meningkatnya infeksi akibat bakteri *Multi Drug Resistance* (MDR) menjadi ancaman serius bagi kesehatan global, sehingga dibutuhkan sumber antibiotik baru yang efektif. Indonesia memiliki kekayaan hayati laut yang tinggi, termasuk *sponge* yang menjadi inang bagi bakteri asosiasi penghasil senyawa bioaktif yang berpotensi untuk mengatasi infeksi bakteri MDR. Penelitian ini bertujuan mengeksplorasi potensi antibakteri dari bakteri asosiasi *sponge* *Biemna* sp. terhadap bakteri MDR serta mengidentifikasi spesies bakteri dengan zona hambat terbesar dan konsisten. *Sponge* diambil dari perairan Batu Niti, Tulamben, Bali, lalu diisolasi dan dikultur bakteri asosiasinya. Metabolit sekunder diekstraksi dengan metode maserasi menggunakan etil asetat. Metode difusi cakram digunakan untuk uji aktivitas antibakteri terhadap empat strain bakteri MDR: *Methicillin-Resistant Staphylococcus aureus* (MRSA), *Extended-spectrum β -lactamase-producing Escherichia coli* (ESBL-E. coli), *Carbapenem-Resistant Klebsiella pneumoniae* (CRKP), dan *Erythromycin-Resistant Bacillus subtilis* (ERBS). Hasil menunjukkan 93% dari isolat bakteri asosiasi memiliki kemampuan aktivitas antibakteri terhadap bakteri MDR, dengan isolat RI.ZA.8 menunjukkan zona hambat terbesar dan konsisten. Identifikasi molekular menggunakan gen 16S rRNA dan analisis BLAST mengungkapkan bahwa isolat RI.ZA.8 memiliki kemiripan tinggi terhadap *Virgibacillus* sp. strain Bac376R dengan nilai *similarity* 82.44%. Temuan penelitian ini menunjukkan bahwa bakteri asosiasi *sponge* *Biemna* sp. berpotensi sebagai sumber senyawa antibakteri baru untuk melawan infeksi bakteri MDR.

Kata Kunci: *Biemna* sp., bakteri asosiasi *sponge*, antibakteri, *Multi Drug Resistance*, identifikasi spesies

ABSTRACT

*The increasing prevalence of infections caused by Multi Drug Resistant (MDR) bacteria poses a major global health threat, demanding new and effective antibiotic sources. Indonesia possesses rich marine biodiversity, including sponges that serve as hosts for symbiotic bacteria capable of producing bioactive compounds to combat MDR bacterial infections. This study aimed to explore the antibacterial potential of sponge-associated bacteria from *Biemna* sp. against MDR bacteria and to identify the bacterial species showing the largest and consistent inhibition zone. The sample was collected from Batu Niti waters, Tulamben, Bali, followed by isolation and culturing of its associated bacteria. Secondary metabolites were extracted using the maceration with ethyl acetate. The disk diffusion was applied to evaluate the antibacterial activity against four MDR strains: Methicillin-Resistant *Staphylococcus aureus* (MRSA), Extended-spectrum β -lactamase-producing *Escherichia coli* (ESBL-E. coli), Carbapenem-Resistant *Klebsiella pneumoniae* (CRKP), and Erythromycin-Resistant *Bacillus subtilis* (ERBS). Results showed 93% of the isolates had antibacterial activity, with RI.ZA.8 exhibiting the largest and consistent inhibition zones. Molecular identification using the 16S rRNA gene and BLAST analysis revealed that RI.ZA.8 had 82.44% similarity with *Virgibacillus* sp. strain Bac376R. These findings indicate that sponge-associated bacteria from *Biemna* sp. are a potential source of new antibacterial compounds for combating MDR infections.*

Keywords: *Biemna* sp., sponge-associated bacteria, antibacterial, Multi Drug Resistance, species identification

