INTISARI

Latar Belakang : Prevalensi bakteri resisten semakin meningkat setiap tahunnya di Indonesia. Resistensi ini terjadi pada beberapa kelompok agen antimikroba sekaligus. Salah satu penyebab terjadinya resistensi mikroba adalah kemampuan mikroba dalam membentuk suatu biofilm. Biofilm merupakan kumpulan mikroba, biasanya polimikroba, didalam matriks ekstraseluler. Mekanisme pembentukan biofilm melalui proses yang melibatkan aktivitas yang disebut *quorum-sensing*. Actinomycetes merupakan mikroba yang dikenal sebagai produsen antimikroba. Amo.128 merupakan actinomycete koleksi Laboratorium Bioteknologi, BRIN Serpong, diharapkan memiliki aktivitas antimikroba dan antibiofilm. Isolat amo.128 merupakan aktinomisete yang diisolasi dari hewan laut di Pulau Seribu, Jakarta. Identifikasi lebih lengkap perlu dilakukan untuk memastikan identitas dan karakteristik isolat yang akan digunakan untuk menghasilkan senyawa antibakteri dan antibiofilm. Selain itu, mekanisme penghambatan *quorum-sensing* juga dilakukan secara *in silico.*

Tujuan Penelitian : Mengidentifikasi actinomycete amo.128 secara makroskopis, mikroskopis, dan molekuler, mengetahui aktivitasnya metabolitnya sebagai antibakteri dan antibiofilm, mengidentifikasi kandungan metabolit sekunder, dan untuk memahami mekanisme penghambatan *quorum sensing* secara *in silico.*

Metode : Actinomycetes amo.128 diidentifikasi secara makroskopis, mikroskopis, dan molekuler menggunakan mikroskop dan PCR. Identifikasi kandungan senyawa dilakukan dengan LC-HRMS dan FTIR. Penentuan aktivitas antibakteri dan antibiofilm dilakukan dengan mikrodilusi dan uji kristal violet. Mekanisme penghambatan quorum sensing secara *in silico* dengan target protein adalah *SdiA*, *AgrA* dan *CviR*

Hasil Penelitian : Isolat amo.128 memiliki kemiripan 100% dengan *Streptomyces parvus* strain NBRC 14599. Metabolit amo.128 mengandung senyawa antara lain N-asetyltyramin (16,66%), cyclophenylalanilprolyl (7,97%), dan golongan senyawa pyrrol-pyrazine (6,45%). MIC/MBC/MIC_{50} ekstrak amo.128 terhadap *S. aureus* adalah 25/50/28,48 ppm sementara pada *E. coli* adalah 100/200/49,38 ppm. Metabolit isolat amo.128 menghambat dan mereduksi biofilm masing-masing terhadap *S. aureus* dan *E. coli* dengan nilai BIC_{50} 3.425 ppm; 57.07 ppm dan BRC_{50} 62,07 ppm; 60,44 ppm. Senyawa *metabolit amo.128* memiliki potensi sebagai *quorum sensing inhibitor*.

Kesimpulan : Isolat amo.128 memiliki kemiripan 100% dengan *Streptomyces parvus* strain NBRC 14599, memiliki kandungan metabolit sekunder N-asetyltyramin, cyclophenylalanylprolyl, dan golongan senyawa pyrrol-pyrazine. Metabolit amo.128 memiliki potensi sebagai antibakteri terutama bakteri Gram + dan potensi untuk dikembangkan sebagai antibakteri Gram +. Senyawa metabolit amo.128 memiliki potensi sebagai *quorum sensing inhibitor.*

Kata Kunci : isolat amo.128, antibakteri, antibiofilm, *quorum sensing inhibitor*

ABSTRACT

Background: The prevalence of resistant bacteria is increasing every year in Indonesia. This resistance occurs in several antimicrobial groups. One of the causes of microbial resistance is the ability of microbes to form biofilms. Biofilms are collections of microbes, usually polymicrobial, in an extracellular matrix. The mechanism for biofilm formation is through a process that involves an activity called quorum sensing. Actinomycetes are microbes known as antimicrobial producers. Amo.128 is an actinomycete from the collection of the Laboratory Biotechnology, BRIN Serpong, which is expected to have both antimicrobial and antibiofilm activity. The amo.128 isolate is an actinomycete isolated from marine animals at Seribu Island, Jakarta. More complete identification needs to be carried out to ensure the identity and characteristics of the isolate that will be used to produce antibacterial and antibiofilm compounds. Besides, the quorum sensing inhibition mechanism was also carried out using in silico.

Objective: to identify amo.128 macroscopically, microscopically, and molecularly; to determine the antibacterial and antibiofilm activity; to identify secondary metabolites; and to understand the mechanism of quorum sensing inhibition by in silico

Method: Actinomycete amo.128 was identified macroscopically, microscopically, and molecularly using a microscope and PCR. Identification of components was performed by LC-HRMS and FTIR. Determining antibacterial and antibiofilm activity was performed by microdilution and crystal violet assay. The mechanism of quorum sensing inhibition by in silico with proteins target was *SdiA*, *AgrA*, and *CviR*.

Results: Isolate amo.128 is a genus of *Streptomyces* based on microscopic, macroscopic, and molecular identification. Phylogenetic analysis of the amo.128 isolate has a 100% similarity to the *Streptomyces parvus* strain NBRC 14599. Metabolites amo.128 contains several compounds, including N-acetyltyramine (16.66%), cyclophenylalanylprolyl/cFP (7.97%), and pyrrol-pyrazine groups (6.45%). The MIC/MBC/MIC_{50} of amo.128 metabolites against *S. aureus* is 25/50/28.48 ppm while in *E. coli* is 100/200/49.38 ppm. Amo.128 isolate metabolites inhibited and reduced biofilms against *S. aureus* and *E. coli*, respectively, with BIC_{50} values of 3,425 ppm and 57.07 ppm and BRC_{50} 62.07 ppm and 60.44 ppm. Amo.128 metabolite compound has the potential activity as a quorum-sensing inhibitor.

Conclusion: Isolate amo.128 has 100% similarity to *Streptomyces parvus* strain NBRC 14599 and contains secondary metabolites N-acetyltyramin, cyclophenylalanylprolyl, and pyrrol-pyrrazine compounds. Isolate amo.128 metabolites have the potential to be developed as antibacterials especially againts Gram (+) bacteria. Amo.128 metabolite compounds have the potential activity as quorum-sensing inhibitors.

Keywords: *isolate amo.128, antibacterial, antibiofilm, quorum sensing inhibitor*