

ABSTRACT

Erika Putri Juarsa 24020221140054. **Potential Antibacterial and Antioxidant Activities of Lactic Acid Bacteria Isolated from Eco-enzymes and Their Molecular Identification.** Supervised by Siti Nur Jannah and Nisrina Fitri Nurjannah.

Increasing antibiotic resistance, particularly caused by *Staphylococcus aureus*, has encouraged the search for alternative antibacterial agents from natural sources. Eco-enzyme is a liquid produced through the fermentation of organic waste such as fruits and vegetables and contains various microorganisms, including lactic acid bacteria (LAB) that may possess antibacterial and antioxidant activities. This study aimed to isolate and molecularly identify LAB from eco-enzyme and to evaluate their antibacterial and antioxidant potential. LAB isolation was carried out using the streak plate method on MRSA medium supplemented with CaCO₃. The obtained colonies were characterized based on colony morphology, Gram staining, and catalase test. Antibacterial activity was tested against *Staphylococcus aureus* using the disc diffusion method, while antioxidant activity was evaluated using the DPPH method to determine the IC₅₀ value. Molecular identification was conducted through DNA isolation, amplification of the 16S rRNA gene using PCR with primers 27F and 1492R, followed by sequence analysis using BLAST and phylogenetic tree construction using the Neighbor Joining method. The results showed that the LAB isolate was Gram positive, rod shaped, and catalase negative. The antibacterial test showed an inhibition zone against *S. aureus* with an average diameter of 7.93 ± 0.31 mm, which is categorized as weak antibacterial activity. Antioxidant testing showed an IC₅₀ value of approximately 28.5%, indicating strong antioxidant activity. Molecular analysis revealed a 99.30% similarity with *Lactobacillus pentosus* strain NBRC 106467 with a bootstrap value of 87 in the phylogenetic tree. These results indicate that LAB isolates from eco-enzyme have potential as natural antibacterial and antioxidant sources.

Keywords: antibacterial, antioxidant, lactic acid bacteria, eco-enzyme, *Staphylococcus aureus*