The molecular phenomenon of the blaZ genes forming beta-lactamase enzymes structure in Staphylococcus aureus resistant to beta-lactam antibiotics (ampicillin)

Abstrak:

Background: Nowadays, infectious diseases still become problems. One of the bacteria causing infectious diseases is S. aureus. In the effort to deal with infections caused by S. aureus, beta-lactam antibiotics, such as ampicillin, are used. In fact, it is unfortunately known that many of S. aureus bacteria are resistant to this group of antibiotics. One of the reasons is known because of nucleotide base changes in the structure of the genes (blaZ) which encode beta-lactamase enzymes in S. aureus. Purpose: The objective of this study is to analyze the nucleotide base changes in the structure of the genes (blaZ) forming beta-lactamase enzymes in S. aureus resistant to ampicillin based on molecular point of view. Methods: Molecular examinations were conducted by isolating the genes, forming beta-lactamase enzyme, which length was 845bp, from 7 isolates of S. aureus resistant to ampicillin by using PCR technique. The results of blaZ amplification were then subjected to homology by using Tn 552 of S. aureus obtained from Bank of Genes. Results: Based on the result of the homology, it was found that there was a change in purine base T→G, which was a pyrimidine base at the -37 position of the initial codon of blaZ. This change, however, did not affect the strength of the promoter since the number of A and T is still more than the number of G and C. In the structure of the gene (blaZ) there was even no mutation or deletion or nucleotide base substitution found, so it would not affect the effectiveness of beta-lactamase enzyme. Conclusion: It can be concluded that the resistance of S. aureus towards ampicillin is not caused by nucleotide base deletion/substitution. Instead, it is suspected that there are other causes leading to the resistance, including the overproduction of beta-lactamase enzyme, causing the degradation of beta-lactam antibiotics conducted by the beta-lactamase enzyme.

Keyword: