

Abstract

Staphylococcus aureus is a pathogenic bacterium that can cause serious infections and is becoming increasingly resistant to conventional antibiotics. Therefore, an effective and environmentally friendly antibacterial alternative is needed. This study aims to evaluate the effectiveness of a combination of *Moringa oleifera* leaf extract and chitosan nanoparticles derived from shrimp shell waste as an antibacterial agent against *Staphylococcus aureus*. *Moringa* leaf extract was obtained using the maceration method with 70% ethanol as the solvent, while chitosan nanoparticles were synthesized through the ionic gelation method. Nanoparticle characterization was performed using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional group changes. The antibacterial activity test was conducted using the agar diffusion method, showing that the combination of *Moringa* leaf extract and chitosan nanoparticles produced a larger inhibition zone compared to *Moringa* extract alone. The results indicate that chitosan nanoparticles enhance the antibacterial effectiveness of *Moringa* leaf extract against *Staphylococcus aureus*. Thus, this combination has the potential to serve as a natural and eco-friendly antibacterial alternative, which can be further developed for medical or pharmaceutical applications.

Keywords: *Staphylococcus aureus*, *Moringa oleifera*, chitosan nanoparticles, antibacterial