ABSTRACT

The present study was conducted for utilization of biogenically synthesized antimicrobial peptide (AMP)-silver nanoconjugates produced from Lactic Acid Bacteria (LAB). In an attempt to curb the health and environmental hazards of chemical food preservatives, a continuous search for natural alternatives is going on continuously. Despite many reports on antagonistic activity of bacteriocins, certain shortcomings including narrow spectrum of activity and requirement of high dosage obstruct in it becoming a practicable approach. Bioconjugation of AMPs with silver nanoparticles is proposed as a resourceful means for enhancing the antimicrobial potential of AMPs. For this purpose, a culture of *Lactobacillus sp.* was isolated and identified from commercially available probiotic known as HiFlora, obtained from a local pharmacy in Lahore. Partial purification of AMP was carried out and its molecular weight was determined using SDS-PAGE. Biogenic synthesis of AMP-nanoconjugates was carried out along with optimization of concentration ratio, temperature and pH. Lastly, antimicrobial activity of AMP-AgNPs was evaluated using disc diffusion assay against six indicator bacteria including *Escherichia coli*, *Salmonella sp.*, *Staphylococcus aureus*, multi drug resistant *Klebsiella sp.*, *Bacillus subtilis* and Methicillin-resistant *Staphylococcus aureus*. The results of this study show successful isolation of *Lactobacillus sp.* from HiFlora. Protein bands of approximately 50 kDa were visualized on the SDS gel. The UV-Visible analysis of AMP-AgNPs depicted a concentration ratio of 1:9 (v/v), pH of 10 and incubation temperature of 65°C to be optimum for effective biosynthesis. FTIR enabled the confirmation of capping or coating of AMPs onto the silver nanoparticles' surface. Results of in vitro activity showed synergistic antibacterial efficacy of AMP-AgNPs as their activity was considerably greater than that of individual activity of partially purified AMP. The biogenically synthesized AMP-nanoconjugates showed remarkable antibacterial potential against all bacteria especially against MRSA and multi drug resistant *Klebsiella sp.*, which is a stepping stone in use of these composites against drug resistant microorganisms