Abstract

With growing use of medicines, different bacterial strains have started to show resistance against many broad-spectrum drugs. This bacterial genetic resistance has emerged as an alarming problem, which demands the development of new and enhanced drug design. In this regard, biosynthetic silver nanoparticles (AgNPs) have been thought to increase the action of antibiotics many folds. The use of nanoparticles (NPs) in combination with antibiotics would require less amount of drug, which reduces their toxicity and side effects caused by antibiotics. Moreover, these nanoconjugates exhibits enhanced antibacterial efficiency compared to free active drug molecules. Thus, simple AgNPs were biosynthesized using extract of clove buds, which were then conjugated with pure cefadroxil. The simple AgNPs and their nanoconjugates, AgNPs-Cef were characterized through UV-VIS and FTIR spectroscopy. Their morphology was analyzed using SEM-EDX. SEM micrographs has confirmed their spherical shape ranged between 24-30 nm. Simple AgNPs showed SPR peak at 410 nm, while this peak was shifted towards longer wavelength (430 nm) for nanoconjugates, AgNPs-Cef, which has confirmed their conjugation. The data from FTIR spectrum indicates the involvement of OH group in the bio-reduction of silver ions. However, CO group was involved in the conjugation of cefadroxil with AgNPs. Also, the FTIR data revealed the peak at 518 and 543 cm^{-1} for AgNPs. Furthermore, the antibacterial action of AgNPs and AgNPs-Cef was evaluated by calculating minimum inhibitory conc. (MIC), minimum bactericidal concentration (MBC), and well diffusion technique. For this purpose, four bacterial strains including *E. coli., S. shigella, B. subtilis,* and *B. licheniformis,* were used. The MIC values revealed that the same amount of AgNPs-Cef was required to limit the bacterial growth as that of cefadroxil. Also, the MBC values showed that less amount of AgNPs-Cef has killed the 99.9% bacteria as compared to free cefadroxil. This concludes that these nanoconjugates with reduced toxicity and enhanced antibacterial efficacy could be used to eradicate the bacterial resistance against cefadroxil.