

Farhad Moradi

Shiraz University of Medical Sciences, Iran



Recent advance on nanoparticles or nanomaterials with anti-multidrug resistant bacteria and anti-bacterial biofilm properties: A systematic review

Abstract:

Objective: With the wide spread of Multidrug-resistant bacteria (MDR) due to the transfer and acquisition of antibiotic resistance genes and the formation of microbial biofilm, various researchers around the world are looking for a solution to overcome these resistances. One potential strategy and the best candidate to overcome these infections is using an effective nanomaterial with antibacterial properties against them.

Methods and analysis: In this study, we overview nanomaterials with anti-MDR bacteria and antibiofilm properties. Hence, we systematically explored biomedical databases (Web of Sciences, Google Scholar, PubMed, and Scopus) to categorize related studies about nanomaterial with anti-MDR bacteria and anti-biofilm activities from 2007 to December 2022.

Results: In total, forty-one studies were investigated to find antibacterial and anti-biofilm information about the nanomaterial during 2007–2022. According to the collected documents, nineteen types of nanomaterial showed putative antibacterial effects such as Cu, Ag, Au, Au/Pt, TiO₂, Al₂O₃, ZnO, Se, CuO, Cu/Ni, Cu/Zn, Fe₃O₄, Au/Fe₃O₄, Au/Ag, Au/Pt, Graphene O, and CuS. In addition, seven types of them considered as anti-biofilm agents such as Ag, ZnO, Au/Ag, Graphene O, Cu, Fe₃O₄, and Au/Ag.

Conclusion: According to the studies, each of nanomaterial has been designed with different methods and their effects against standard strains, clinical strains, MDR strains, and bacterial biofilms have been investigated in-vitro and in-vivo conditions. In addition, nanomaterials have different destructive mechanism on bacterial structures. Various nanoparticles (NP) introduced as the best candidate to designing new drug and medical equipment preventing infectious disease outbreaks by overcome antibiotic resistance and bacterial biofilm

Biography

Dr. Farhad Moradi is a PhD Candidate of medical laboratory Science (Clinical Bacteriology) at the age in Department of Bacteriology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran.