Natural Products-Based Metallic Nanoparticles as Antimicrobial Agents

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Abstract Natural products offer a wide range of bioactivity including antimicrobial properties. There are many reports showing the antimicrobial activities of phytochem icals from plants. However, the bioactivity is limited due to multidrug resistant properties of the microorganism and different composition of cell membrane. The antibacterial activity of the natural products is different toward Gram-negative and Gram-positive bacteria. These phenomena are caused by improper physicochemical conditions of the substance which hinder the phytochemical bioactivity against the broad range of bacteria. One of the strategies to improve the antimicrobial action is by biogenic synthesis via redox balance of the antimicrobial active substance with metal to form nanosized materials or nanoparticles (NPs). Antibiotic resistance is not relevant to NPs because the action of NPs is via direct contact with bacterial cell walls without the need of penetration into microbial cells. The NPs that have shown their effectiveness in preventing or overcoming biofilm formation such as silver-based nanoparticles (AgNPs), gold-based nanoparticles (AuNPs), platinum-based nanoparticles (PtNPs) and Zinc oxide-based nanoparticles (ZnONPs). Due to its considerably simple synthesis procedure has encouraged researchers to explore antimicrobial potency of metallic nanoparticles. Those metallic nanoparticles remarkably express synergistic effects against the microorganisms tested by affecting bacterial redox balance, thus disrupting their homeostasis. In this paper, we discuss the type of metallic nanoparticle which have been used to improve the antimicrobial activity of plant extract/constituents, preparation or synthesis process and characterisation of the plant-based metallic nanoparticles.

Keywords **Author Keywords:** antimicrobial; nanoparticles; gold nanoparticle; silver nanoparticle; natural products; green synthesis
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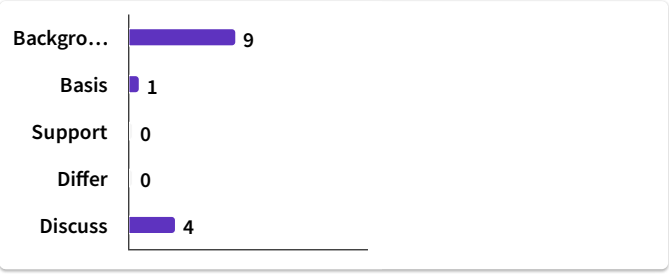

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