Marasmius oreades Mediated Silver Nanoparticles Synthesis: An Ecofriendly Tool against *Anopheles stephensi* and its Effect on Predatory Copepods

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Abstract

Malaria remains a decisive problem for public health due to the emergence and spread of *Plasmodium falciparum* strains resistant to chemical drug all over the world. There is an insistent to investigate new and valuable sources of antimalarial drugs. This research fabricated a novel method of mushroom-mediated synthesis of silver nanoparticles (AgNP) using a cheap mushroom extract of *Marasmius oreades*, acting as a reducing and capping agent. AgNP were characterized by UV–vis spectrophotometry, Fourier transform infrared (FTIR) spectroscopy, energy-dispersive X-ray spectroscopy (EDX), and X-ray diffraction (XRD). In mosquitocidal assays, LC_{50} of *M.oreades* mushroom extract against *Anopheles stephensi* ranged from 50.0 (larva I) to 110.1 ppm (pupa). LC_{50} of *M.oreades* -synthesized AgNP ranged from 3.917 (larva I) to 9.704 ppm (pupa). LC_{50} of *M.oreades* -synthesized nanoencapsulated AgNP ranged from 3.055 (larva I) to 8.934 ppm (pupa). Furthermore, the antiplasmodial activity of *M.oreades* mushroom extract and green-synthesized AgNP was evaluated against CQ-resistant (CQ-r) and CQ-sensitive (CQ-s) strains of *P. falciparum*. IC50 of *M.oreades* was 65.78 µg/mL (CQ-s) and 69.67 µg/mL (CQ-r); *M.oreades* -synthesized AgNP achieved IC50 of 43.54 µg/mL (CQ-s) and 48.13 µg/ml (CQ-r). The AgNP did not show evidence of any noticeable toxicity on *Cyclops bicuspidatus* after 5 days of exposure. Overall, the outcome highlighted that mushroom-synthesized AgNP could be candidated as a new tool against *P. falciparum* and diverse developmental instars of its primary vector *An. stephensi.*

Keywords: *Marasmius oreades,* Malaria, Nano-encapsulation

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