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Paper Title: Characterization and Nano-Efficacy Study of Palladium Nanoparticles against Larvae of *Anopheles stephensi* (Liston)

Abstract: Nanoparticles are now being used to reduce the risk of mosquito-borne diseases. Nano-palladium has been used as a catalyst and in disease control. We aim for the green synthesis of palladium nanoparticles (PdNPs) using plant extract. The synthesized nanoparticles have a wide range of applications like nano-toxicity and efficacy against vectors of diseases. The application of environmental friendly PdNPs synthesized with the extract of plant Citrus limon against mosquito larvae could provide an effective aid against mosquito-borne tropical diseases. The synthesized nanoparticles were characterized and bioassay was evaluated against 3rd instar larvae of *Anopheles stephensi* mosquito. Surface plasmon resonance (SPR) band was observed at 450nm in UV-Visible spectrum. Active participation of biomolecules of leaf extract was confirmed with the band analysis of FT-IR spectrum. TEM analysis has shown the formation of nanoparticles with the diameter ranged from 1.9nm – 4.8nm. Elemental analysis of particles was done by SEM and EDX analysis. Mortality in test concentrations were recorded after 24h, 48h, and 72h of exposure. A lethal Concentrations (LC50) has been calculated using probit analysis. Mortality due to leaf extract was not observed after 72h in the positive control. LC50 for percent test concentrations containing PdNPs showed LC50 at 16.038%, 13.231%, and 7.215% after 24h, 48h and 72h respectively. Results showed that larvicidal effectiveness of PdNPs increases with time. This can be useful in tackling emerging insecticide resistance and mosquitoes borne diseases worldwide.

Keywords: Palladium nanoparticles; Green synthesis; Efficacy; Mosquito larvicides; Characterization; Nanotoxicity

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