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Development of nano-based microemulsion from tea tree oil and silver nanoparticles and assessment of their enhanced antimicrobial activities against representative wound infecting pathogensAshraf Osman Abdellatif Mohamed^{1,2}, Suad Y Alkarib¹ and Alaa M Shawkey²¹Karary University, Sudan²Cairo University, Egypt

Combining and incorporating of the natural antimicrobials with metal nanoparticles is a growing research area because of their potential applications in nanomedicines to enhance and synergize their activity as well as to minimize unwanted side effects by using lower concentrations. The aim of the present study was to investigate the feasibility of using tea tree oil (TTO) and greenly synthesized silver nanoparticles (AgNPs) alone and in micro emulsion combination formula against representative wound infecting pathogens namely; *Staphylococcus aureus*, methicillin resistant *Staphylococcus aureus* (MRSA), *Pseudomonas aeruginosa* and *Candida albicans*. The result of the bioassay showed that both TTO-AgNPs combination possesses a potential antimicrobial property. Based on the minimum lethal concentration (MLC), the fractional lethal concentration index (FLCI) showed that treatment with combinations of TTO and AgNPs exerted a synergistic effect against MRSA (FLCI=0.233) followed by *P. aeruginosa* (FLCI=0.263) and indifferent effects against *S. aureus* and *C. albicans* (0.53 and 0.73, respectively). As well, analysis of the morphological changes in *S. aureus* cells by transmission electron microscope (TEM) revealed that, AgNPs aggregated and located non-specifically on the cell wall, also, AgNPs were seen within the cell wall or the cell of bacteria. The cells became severely distorted and disrupted showing a bactericidal action when compared to untreated cells. In conclusion, these results showed the potential of using TTO and AgNPs in form of micro-emulsion combination and this could be developed into a broad spectrum pharmaceutical product for treating wound infections.

Biography

Ashraf Osman Abdellatif Mohamed is currently a PhD student at Faculty of Pharmacy, Cairo University, Egypt. He has published five papers in reputed journals.

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