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Development and evaluation of gel incorporated with synthesized silver nanoparticle from *Ocimum gratissimum* for the treatment of acne vulgaris

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Almost 80% of the adolescent populations of the world are affected by acne vulgaris specifically during their puberty stage of life. Bacteria develop antibiotic resistance on repeated treatment with particular antibiotics by forming a rapport between the bacteria and antibiotic. In olden days, plants were used as a medicine for several diseases. Development of formulation for the treatment of acne is a major focused research in pharmaceutical sciences especially, in cosmetic care industries. The objective of our research is to prepare silver nanoparticles from the leaf extract of *Ocimum gratissimum* and develop topical herbal gel formulation for the effective treatment of acne. Based on the research literature, the medicinal plant *Ocimum gratissimum* is selected due to enormous pharmacological activity in relevance to acne. Methanolic leaf extract was prepared and analyzed for its phytoconstituents. The results of the study revealed the presence of phytoconstituents like alkaloids, flavonoids, tannins and saponins in the extract. 1mM aqueous solution of silver nitrate was used with the methanolic extract of *Ocimum gratissimum* for the preparation of silver nanoparticles. Formation of silver nanoparticles was confirmed by UV spectroscopy. Synthesized silver nanoparticles were spherical in shape with the average particle size of 207.6 nm and the polydispersity index was found to be 0.256. These synthesized silver nanoparticles were incorporated into the gel base using Carbopol 934 and HPMC (1%w/v) and evaluated for its physicochemical properties and antibacterial activity. The results demonstrated that the developed topical herbal gel had easy washability, good spreadability and pH was found to be 6.72 and 6.80. Antibacterial study of the developed formulation showed higher inhibitory activity against *Propionibacterium acnes*, *Staphylococcus aureus* and *Escherichia coli* when compared to the extract. The results of our study concluded that silver nanoparticle of *Ocimum gratissimum* in aqueous gel base may be used for the treatment of acne vulgaris.

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