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Green Synthesis of Silver Nanoparticles from Leaf Extract of *Mimusops Elengi*, Linn. and Evaluation of its Anticancer Activity

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Abstarct: These days, there is interest in using green synthesis to create metallic silver nanoparticles as an alternative to physical and chemical methods. Silver nanoparticles (AgNPs) were created in the current study using a room-temperature leaf extract of Mimusops elengi, L. At 1 mM concentrations of silver nitrate (AgNO3), steady AgNP formation usually produced spherical particles with diameters ranging from 55 to 83 nm. Particle formation's kinetic characteristics were directly correlated with the AgNO3 solution's concentration and investigating the anticancer activity of these green synthesized nanoparticles against Breast Cancer Cell Line(MCF-7 cell line).

Introduction

Metal ions may be reduced to metal nanoparticles by natural sources(1). AgNPs have been applied in a number of ways, including antimicrobial action(2), electrical conductivity(3)(4) and catalysis. How big, how round, and how the surface of The physical and chemical properties are greatly influenced by nanoparticles. When creating metal nanoparticles through chemical reduction, stabilizing agents were frequently added to the mixture to avoid unintended colloidal aggregation. In addition, metal nanoparticles produced chemically are pricy, environmentally dangerous, and energy-intensive. It has been proposed that biological techniques, which use plant extracts to synthesize metal nanoparticles, are a useful complement to chemical methods(5). Given that metal nanoparticles are frequently used in the biomedical industry, The need for environmentally acceptable, extremely stable metal bio-nanoparticles that can be produced on a wide scale without the use of hazardous chemicals is growing. Numerous studies have been published on the use of natural resources, such as plants and microorganisms, in the green chemistry process of producing silver nanoparticles(6). A number of plant extracts, including neem leaf broth (Azadirachta indica), Pelargonium graveolens, Geranium leaves, Medicago sativa (alfalfa), Aloe vera, Emblica officinalis (Amla, Indian Gooseberry), Acalypha indica leaf, Sorbus aucuparia leaf, and Cinnamomum camphora, have already been used in the synthesis of bioactive silver nanoparticles using multiple plant extracts(7)(8). This work describes a novel method for producing silver nanoparticles by the biosynthesis of *Mimusops elengi, L*. (a member of the Sapoteceae family) leaf extract. Aqueous extracts of flowers, fruits, and bark have long been used in traditional medicine. They are mostly used to treat dental conditions like dental caries and pyorrhea, as well as cardiac conditions like menorrhagia and leucorrhoea. A ripe *Mimusops elengi, L*. fruit was crushed and combined with water, and administered to aid in birthing. Dried flower powder was used as a brain tonic and to assist ease head and neck ache(9).

Procedure

The extract was obtained by boiling 5 g of finely chopped leaves in 100 ml of water for 40 minutes. Following the development of the crude extract, filter paper was used for filtration.

Preparation of 1mm silver nitrate (AgNO3) One mm AgNO3 was prepared by weighing 0.0849 mg of AgNO3, dissolving it in double distilled water, and then making up the final volume to 500 ml distilled water. The prepared solution was kept in a flask covered with foil to avoid the photometric induced reaction

In order to maximize this response, the subsequent approach was used: 5ml of the *Mimosops elengi, L.* extract aqueous filtrate and 45ml of AgNO3 were combined to create an aqueous solution. This reaction mixture was left unattended until a dark brown color shift occurred (6).

Anticancer activity

NRU Analysis Using the MCF-7 cell line (purchased from NCCS Pune), the cytotoxicity of the supplied samples was assessed using the NRU (Neutral Red Uptake) Assay. Cells (5000-8000/well) were cultivated in 96-well plates in DMEM media (Dulbecco's Modified Eagle media-AT149-1L) at 37°C with 5% CO2 for 24 hours. The medium was supplemented with 10% FBS (Fetal Bovine Serum - HIMEDIARM 10432) and 1% antibiotic solution. The following day, the medium was taken out and each plate well was filled with brand-new culture medium. The designated wells were filled with 5 µl of treatment dilutions at varying concentrations, and the treated plates were then incubated for a full day. The defined wells were filled with 100 µl of NRU (SRL Chem36248), which is 40 µg/ml in phosphate buffered saline (PBS). The wells were then incubated for one hour using a Heal ForceSmartcell CO2 Incubator-Hf-90. Following the removal of that medium, 100 µl of NRU Destain solution was used to dissolve NRU. Ultimately, plates were scanned using an Elisa Plate Reader (iMark BioRadUSA) at 550/660 nm (10)(11). IC-50 was computed using Graph Pad Prism program.

Results and discussion

Breast Cancer Cell Line: Anti-Cancer Activity Using the NRU (Neutral Red Uptake) Assay, the cytotoxicity of the substances was assessed on the MCF-7 cell line (purchased from NCCS Pune). The cells (between 5000 and 8000 cells per well) were cultivated in 96-well plates for 24 hours at 37°C with 5% CO2 in DMEM medium (Dulbecco's Modified Eagle Medium-AT149-1L) supplemented with 10% FBS (Fetal Bovine Serum - HIMEDIARM 10432) and 1% pharmaceutical solution. Fresh culture medium was poured into each well of the plate the following day after the medium had been withdrawn. Labeled plates were incubated for 24 hours after 5 µl of treatment dilutions (of varying strengths) were introduced to the indicated wells. After being introduced to the designated wells, 100 µl of NRU (SRL Chem36248) (40 µg/ml in PBS, phosphate buffered saline) was incubated.

Table (1) % inhibition of AgNPs

Concentration	% inhibition of AgNPs
0	100
0.78	90.4498
1.56	85.9285
3.125	78.4314
6.25	69.6655
12.5	64.9366
25	52.0185
50	47.6355

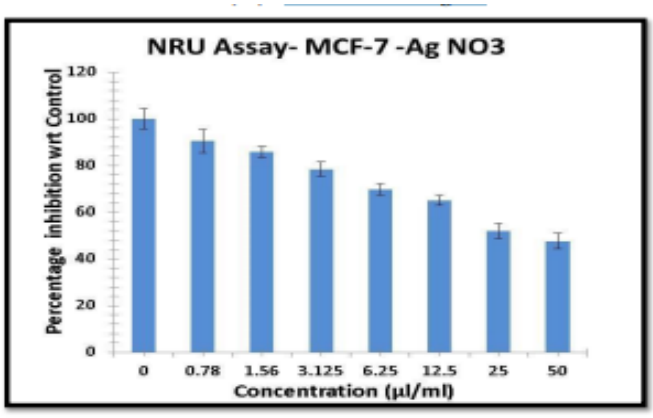

Figure (1) Anti-cancer effect of AgNPs against of breast cancer (MCF-7)

Table (2) % inhibition of M. elengi

Sample Conc.	. % inhibition of M.E
0	100
0.78	115.51
1.56	118.163
3.125	115.102
6.25	113.265
12.5	115.714

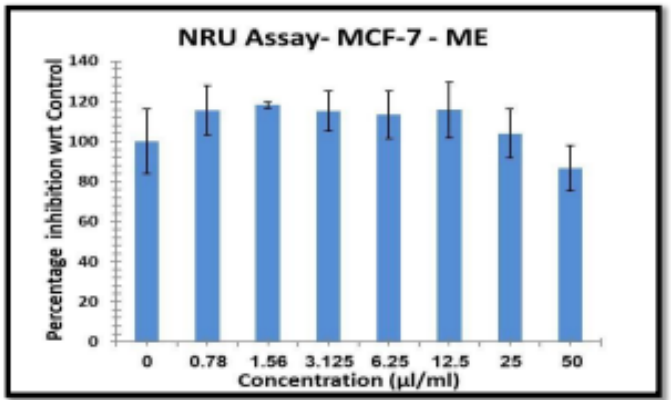

Figure (2) Anti-cancer effect of M. elengi against of breast cancer (MCF-7)

Table (3)IC50 value of AgNPs and M. elengi

Sample code	IC50 value (µl/ml)
AgNO3	24.95
ME	18.24

The IC50 value is the crude extract inhibitory concentration that may inhibit 50% of the cancer cell. The IC50 value is inversely related to activity, and a lower IC50 value indicates greater anticancer activity(12), the results show that *M. ellgini* has lower IC50 value and this indicate that sliver nanoparticles synthesized by *M. elgini* have a better activity than AgNO3and this compatible with (Jang S J et,al 2016)(13).

Conclusion

In this work, we effectively generated silver nanoparticles (NPs) using M. elegini's extract, and we discovered that these NPs were harmful to MCF-7 breast cancer cells in vitro. Overall, the results of this study indicate that green synthetic silver nanoparticles have strong anticancer effects against the MCF-7 human breast cancer cell line.

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