



Antioxidant activity of silver nanoparticles synthesis using *Cinnamomum verum* and *Phyllanthus emblica* formulation

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ABSTRACT



Nanotechnology is defined as a very broad field of science which is as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, molecular engineering etc. Nanotechnology might have the option to make numerous new materials and devices with a huge scope of use, for example, in Nano medicine, Nano electronics, and bio materials energy creation. *Phyllanthus emblica* is a remarkable supply of diet C; consequently, it facilitates increase your immunity. Its dietary profile additionally comes studied with a variety of polyphenols which are acknowledged to combat towards the improvement of most cancers cells. *Cinnamomum verum* is stocked with powerful antioxidants which protects the body from oxidative damage caused by free radicals. The physical characterization of these silver nanoparticles was verified using UV - visible spectroscopy and the surface Plasmon resonance band was formed at 400nm of silver nanoparticles. The silver nanoparticles synthesized using *Cinnamomum verum* and *Phyllanthus emblica* extract showed higher antioxidant activity.

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INTRODUCTION

Phyllanthus emblica, which belongs to the family Phyllanthaceae, is also known as emblic, emblic myrobalan, myrobalan, Indian gooseberry, Malacca tree or amla. This extract from these fruits has been utilized in traditional medicine to treat symptoms ranging from constipation to the treatment

of tumors (Unander *et al.*, 1990). *Phyllanthus emblica* extracts have been found to have anti-tumour properties against certain tumours (Ngamkitidechakul *et al.*, 2010), and antioxidant, anti-diabetics, hypo-lipidemic, antibacterial, gastro protective and chemo preventive properties (Mirunalini and Krishnaveni, 2010). The small, tropical, ever-green tree most noted for its bark, *Cinnamomum velum* or *Cinnamomum zeylanicum*, provides the world with the most widely known spice, cinnamon. The scientific name is *Cinnamomum zeylanicum*; it is one of the most important and common spices used not only for cooking and modern medicine. In general, among the cinnamon genus, more or less 250 species have been described, with trees scattered around the world (Sangal, 2011; Vangalapati *et al.*, 2012).

Nanotechnology can be described as the engineering and science elaborate in the synthesis, design, application of materials and characterization and devices whose compact, functional organization,

in at least one dimension, is on the nanometer scale or one of a billionth of a meter (Agarwal *et al.*, 2017). Tokyo Science university was first described the "Nanotechnology", Norio Taniguchi in 1974 (Santhoshkumar *et al.*, 2017). These technologies encompass protein arrays, Nano pore technology, Nano arrays, nanoparticles (NPs) as an expedient in immunoassays and Nano sensors, among others. Quantum dots (semiconductors) and gold NPs are the most extensively used, but new materials are accessible as more molecular entities are found as amenable to Nano scale design and fabrication. The expansion of a phenomenon is Nano biosensors, in which antibody-based piezoelectric Nano biosensors are well maturing (Menon, 2017; Rajeshkumar *et al.*, 2018). The currently being developed application of nanotechnology in medicine requires the use of nanoparticles to transmit drugs, heat, light or other substances to specific cell types (such as cancer cells). This approach prevents damage to healthy cells in the body and helps diseases to be identified sooner. (Agarwal *et al.*, 2018).

Silver nanoparticles are nanoparticles of silver size ranging from 1 nm to 100 nm. Although often described as 'silver,' some are made up of a large percentage of silver oxide because of their large surface to bulk silver atom ratio (Santhoshkumar *et al.*, 2019). The properties of human-suitable silver nanoparticles are being studied in laboratory and animal studies to determine potential effectiveness, toxicity and cost. Silver nanoparticles have shown excellent bactericidal properties against a wide variety of microorganisms (Rajeshkumar, 2016; Rajeshkumar and Malarkodi, 2017). As indicated, the physiological function of antioxidants is to prevent damage to cellular components that occur as reverberations of chemical reactions involving free radicals (Kumar and Rajeshkumar, 2018; Rajeshkumar *et al.*, 2016). The redox reaction of Ag⁺ requires a reducing agent. They are used in wound dressings as antimicrobial agents, as topical creams to stop wound infections (Rajeshkumar *et al.*, 2019; Rajeshkumar and Bharath, 2017) and as anticancer agents (Rajeshkumar and Naik, 2018). Therefore, in this study, we evaluated the antioxidant activity of silver nanoparticles synthesis using *Cinnamomum verum* and *Phyllanthus emblica*.

MATERIALS AND METHODS

Preparation of fruit extract

Fresh *Cinnamomum verum* and *Phyllanthus emblica* extract powder was purchased from herbal health care Centre. 0.5 gm of *Cinnamomum verum* and *Phyllanthus emblica* fruit powder was added to 50ml of

distilled water to the conical flask and boiled for 7 to 8 minutes in the heating mantle. The boiled extract was filtered using a filter paper.

Synthesis of nanoparticles

0.0169g of silver nitrate is added to 90ml of distilled water and 100ml of plant extract. The plant extract of the solution is kept in the shaker. The colour change is observed after 2 hours for 3 days for analysis of the synthesis of nanoparticles. The nanoparticle synthesis is measured using the instrument of double beam spectrophotometer. This mixture is centrifuged for 10 minutes and nanoparticles are settled down is taken out with the help of pellet.

Application of antioxidant

Each extract (10-50 µg / ml) in water and ethanol is mixed with 1 ml of methanol ice solution containing DPPH free radicals to determine the scavenging potential for DPPH. Until measuring absorbance at 517 nm, the mixture solution was shaken vigorously and left to stand for 20 minutes in the dark. The scavenging potential was then determined using the equation.

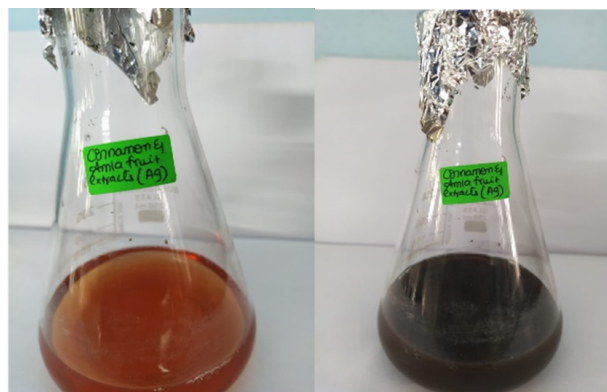


Figure 1: Color changes of silver nanoparticles synthesis

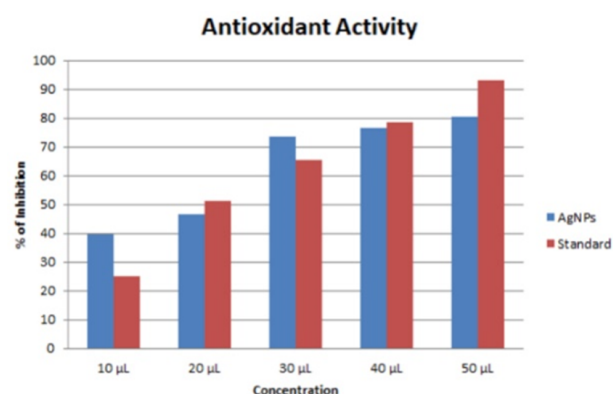


Figure 2: Antioxidant activity of silver nanoparticles

RESULTS

The formation of the nanoparticles began after the extract was combined with the silver nitrate solution. The apparent colour shift of the solution from light brown to dark brown and the formation of silver nanoparticles was confirmed by spectral analysis. It confirmed the AgNPs and vitamin C has the antioxidant activity.

DISCUSSION

In the present study, the synthesis silver nanoparticle from *Cinnamomum verum* and *Phyllanthus emblica* extract was elementary. Our study showed a significant percentage of inhibition as the concentration of the extract increases when compared to the standard vitamin C which may be due to the presence of flavonoids and phenolic compounds that is responsible for its antioxidant activity and also its reducing power. Our results clearly demonstrate the ability of Amla and cinnamon based AgNPs to scavenge free radicals which could be attributed to the presence of functional groups present on the surface of nanoparticles. The same antioxidant property was also demonstrated by V. Ravichandran et al. with the AgNPs synthesized using *Parkia speciosa* leaves. Free radicals are known to have a definite role in a wide variety of pathological manifestation which is combated by the antioxidants.

The colour change of the solution has been observed from light brown to dark brown after 3 days (Figures 1 and 2). The UV-vid spectrometer readings were recorded, the peak at 400nm confirms the nanoparticle synthesis. The antioxidant activity of *Cinnamomum verum* and *Phyllanthus emblica* was compared with the activity of *Cinnamomum verum* and *Phyllanthus emblica* by DPPH method. The concentration of (10,20,30,40,50) μ l the absorbance is (0.223,0.197,0.263,0.534,0.603).

The previous studies shows, that the silver nanoparticles synthesized using various plants, algae and bacteria having significant antimicrobial, antioxidant and anticancer activities (Jeevitha and Rajeshkumar, 2019; Rajeshkumar, 2017).

CONCLUSIONS

Cinnamomum verum and *Phyllanthus emblica* based silver nanoparticles has antioxidant activity against pathogen by scavenging free radical. Antioxidant minimize damage the cells from oxidants and can help fight against ageing, cancer and chronic disease like cardiovascular disease. In dentistry, it can be used as toothpaste, tooth powder and mouth wash.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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