SYNTHESIS OF PENTACYCLIC TRITERPENOIDS SILVER NANOPARTICLES

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ABSTRACT: Nanoparticles are unique subset of the broad field of nanotechnology. Being sparingly soluble and labile biological active substance, it has great potential in the promising drug delivery system. Due to biocompatible and biodegradable properties, it interacts with target cell and improves the function of cell. A well-known versatile drug Lantadene / pentacyclictriterpenoids isolated from *Lantana camara*. Therefore its nanoparticles have been synthesized first time which may provide knowledge of biochemical mechanism in toxication at cellular, subcellular and molecular levels. It leads added rational in the medical field.

Keywords: Silver nanoparticles, Pentacyclictriterpenoids, *drug delivery*, Lantadene,*Lantana camara*

INTRODUCTION:

Reflecting on the last decade of biosensor development, one can apparently perceive the impact of nanotechnology in this research area. Antiquity, Ag-based antiseptics [Ratyakshi and Chauhan;2009] Ag salts showed antibacterial**. [**Khan etal;2011] Biological synthesized silver nanoparticle catalyses the chemical reactions while Pentacyclic triterpenoids exert their antitumor activity through different mechanisms.[Goswami-Giri and Ingawale;2012]Reduction of metal into the particle changes the appearance of it. Therefore the potential andchemical reactivity of this reaction extensively can be used by researcher for drug delivery.[Narayanan and Pal;2008, Hodges ;2011, ShuangToh, etal;2013, Solomon etal;2007]Therefore it is need to develop Lantadene / pentacyclic triterpenoids silver nanoparticle to confirm potential and chemical reactivity in urinary tract infection.

Experimental

Collection and identification of plant material: Fresh plant material- *Lantana camara* was collected in the month of May 2012 from campus of B.N Bandodkar College Thane (MS)-India.

Drying and extraction: Plant materials were thoroughly washed and dried under shade. Dried material of *Lantana camara* was ground to fine powder and 0.8g of this was used for further extraction by cold maceration technique. Powdered plant material was dipped in methanol and kept at room temperature. After 7 days, the extract was filtered through Whatman filter paper no. 1 under vacuum. The residue was again dipped in methanol for 7 days and filtered thereafter. The filtrate was combined and the methanol was evaporated under vacuum using rotary evaporator at 45°C. The dried extracts were stored at 4°C until further analysis.

Extraction of bioactive compound from *Lantana camara L.*: Leaves of *Lantana Camara* were subjected for washing, drying, pulverizing and treated with boiling solvents. The extract was concentrated in vacuum followed by suspended in water and then consequently extracted with ethylacetate and n-butanol. The ethyl acetate fraction was loaded on a silica gel column using a mixture of $CHCl_3$-Methanol with increasing solvent polarity as effluent for the segregation of layers. Neutral layer was examined with n-Hexane and Acetone to yield active compound. Its purity was checked by HPLCusing C-18 column and by qualitative test.

Qualitative test of Pentacyclic triterpenoids: Active compound was treated with Chloroform and refluxed for 30 minutes, after cooling; solution was treated with 3-4 drops of concentrated H_2SO_4. It produced dark red coloration.

Preparation of silver nano particle of lantadene: The silver colloid was prepared by using chemical reduction method. Silver nitrate and tri-sodium citrate of analytical grade purity were used as starting materials without further purification. All solutions of reacting materials were prepared in distilled water. In typical experiment 90 mL of 100M $AgNO_3$ was heated to 80°C-90°C to this solution 10 ml of 1 % tri-sodium citrate was added drop by drop in the solution using magnetic stirrer. In this reaction solution, 10 mL pentacyclic triterpenoids (100µL) was added drop wise under vigorous stirring and was kept under observation in chilled condition for a month. The binding interaction was monitored by spectroscopy, Scanning Eelectron Microscopy and UV of it was carried out at 0', 60',24hrs and after one months.

RESULT AND DISCUSSION:

Dried leaves powder of *Lantana camara*(120 gms) provides 0.24 mgs purified pentacyclic triterpenoids (Lantadene). Appearance of single peak on HPLCconcludes the purity of compound. This pure sample gives dark red aggregation when treated with chloroform and concentrated H_2SO_4.

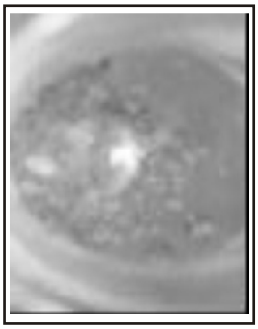

Figure 1 - Pentacyclic Triterpenoids isolated from *Lantana camara.*

Dark red coloration indicates that presence of triterpenoids. It was confirmed and monitored during process of drying, extraction as well as with vacuum distillation followed by silica gel.

Silver nanoparticle: The silver nanoparticles have optical, electrical and thermal properties and being incorporated into pentacyclic triterpenoids that range from photovoltaics to biological and chemicalsensors.

The silver colloid particles were formed immediately after addition of reacting materials. Vigorously shaking with magnetic stirrer along with cooling the colourless solution changed to white, indicates the formation of silver nanoparticles of lantadene whereas without lantadene it showed pink to violet. (Figure 2).

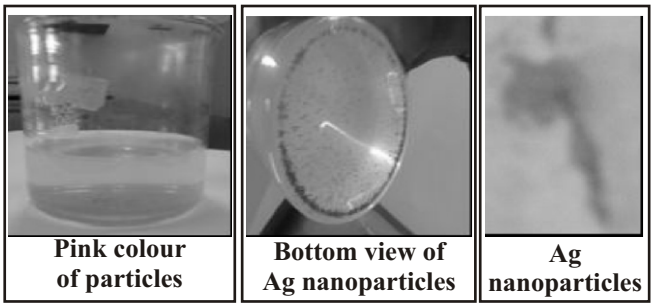

Figure 2 change in colour of silver nanopartcles

Mechanism of reaction could be expressed as follows [**ShuangToh et al; 2013,** Solomon et al ;2007]

$4Ag+ + C_6H_5O_7Na_3 + 2H_2O \rightarrow 4Ag + C_6H_5O_7H_3 + 3Na^+ + H^+ + O_2\uparrow$

Also, Lantadene + Silver nanoparticles = Aggregation

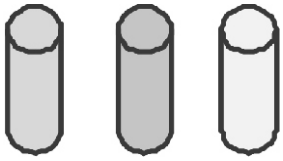

Figure 3 Change in colour of nano particles **a.** Colourless **b.** Pink **c.** White

As the particles increase in size, the absorption peak usually shifts toward the red wavelengths. Increase of absorption indicates that amount of silver nanoparticles increases. The stable position of absorbance peak indicates that new particles do not aggregate. One can understand that since the silver colloidal particles possessed a negative charge due to the adsorbed citrate ions, a repulsive force worked along particles and prevented aggregation. Observed absorption peak of silver nanoparticles of lantadene is 0.343 A^0 at 440 nm confirmed formation of silver nanoparticles (Figure 3). As Lantadene solution was added and solution was allowed to stand for 24 hrs. Aggregation of silver nanoparticles and increase in absorbance was observed. There was no obvious change in peak position for three weeks, except for the increase of absorbance. Nanoparticles produced are of 10-20 nm size as indicated by Scanning Electron Microscope. Electrostatic repulsion between silver nanoparticles takes place as each silver particle surrounded by molecules of citrate and because of which negative charge is generated. Absorption peak shifted from 421 nm to 425 nm after 1 month this change is due to aggregation of silver nanoparticles with time. Larger particles require lesser energy and hence longer wavelength. Moreover as Lantadene is added aggregation occur, this result in more absorption.[**Ratyakshi and Chauhan;2009, ShuangToh et al; 2013]**

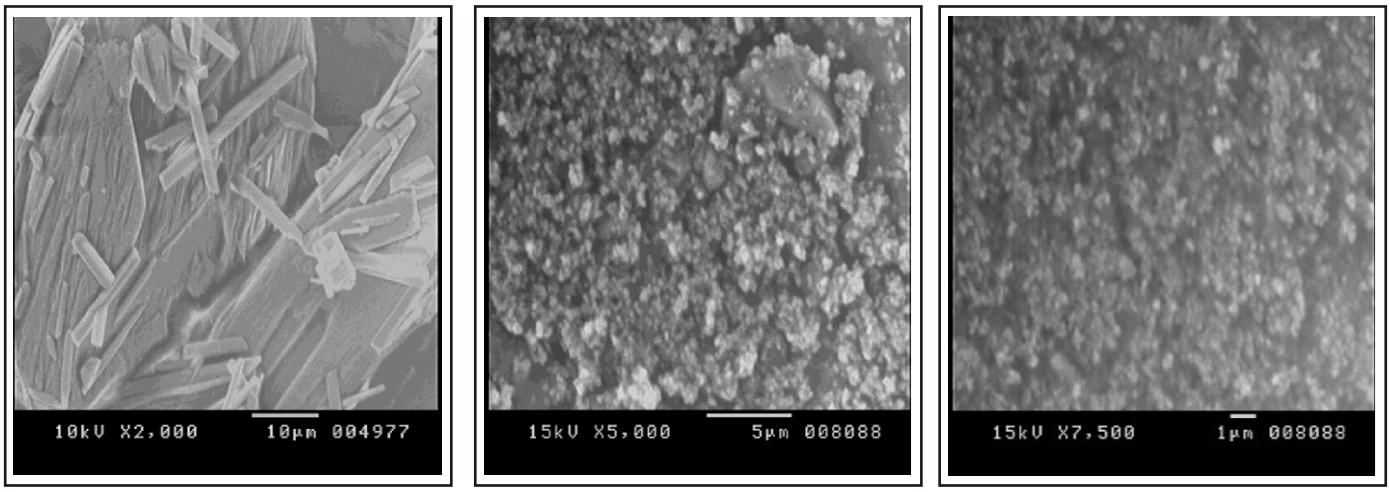

Figure 3- SEM of Ag Nanoparticles **A.** Pure Lantadene (10µm) **B.** Ag Nanoparticles (5 µm) **C.** Ag Nanoparticle Lantadene aggregate (1 µm)

CONCLUSION:

The mechanism of lantadene Ag nanoparticles is first time introduced and prepared by the cost effective reduction method have great effect on uterus promise as antimicrobial agents. Growing interest in understanding the applications of Lantadene Ag nanoparticles based on these findings may lead to valuable discoveries in various fields such as medical devices and antimicrobial systems**.** This study can be used diversified traditional medicinal system to cure diseases and therapeutic use.

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