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Design Synthesis and Characterisation of Silver Nanoparticals Using Dracaena Trifasciata Extracts

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ABSTRACT
Eco-friendly silver nanoparticle AgNPs biosynthesised from the ethanolic extract of the Dracaena trifasciata plant. The UV ether analytical approach is used to analyze the biosynthesis of silver nanoparticles.Using ascorbic acid (vit C)as a standard, prepare silver nanoparticles were examined for their in vitro antioxidant properties using DPPH. Additionally, they were not treated for their in vitro anti-inflammatory properties using the denaturation protein test with diclofenac sodium as the standard.The creation of silver nanoparticles during biosynthesis is indicated by a color shift from colorless to reddish brown ,with maximum absorption occurring at 459 nm [0.441 OD].Comparing DT AgNPs to standard under comparable condition showed no anti-inflammatory action and a strong antioxidant effect.These in-vitro data suitable for in-vivo animal studies.

Keywords: Dracaena trifasciata, antioxidant, DPPH assay, anti-inflammatory, Sliver nanoparticle AgNps, UV.

INTRODUCTION

Dracaena trifasciata (Prain) Mabb. (Asparagaceae) is a perennial herb, commonly known as mother-in-law's tongue, cultivated as an ornamental plant in homes and parks, native to tropical West Africa. The leaves and rhizomes are traditionally used against acne, fungal infections, skin itches, allergies, ulcers, helminths, earache, pharyngitis, urinary diseases, jaundice, analgesics, and antipyretics in various countries. Dracaena trifasciata (Prain) Mabb. (Syn: Sansevieria trifasciata Prain), belonging to the family Asparagaceae, is a perennial herb, native to tropical West Africa, but widely grown as an ornamental plant in houses, gardens, and thickets in many parts of the world. The plant is commonly known as mother-in-law's tongue, snake plant, viper's bowstring hemp, or Saint George's sword. Traditionally, it has important

therapeutic use against acne, fungal infections, skin itches, ulcers, earaches, allergies, helminths, jaundice, pharyngitis, urinary diseases, analgesics, and antipyretics. It is used as a protective charm against evil or bewitchment in Africa and cultivated for its fiber in several tropical countries [Stafford GI, et al. 2008]. Extensive in vivo and in vitro tests have been carried out to prove the ethnopharmacological claims and other bioactivities. These investigations have been accompanied by the isolation and identification of hundreds of phytochemical constituents. The most characteristic metabolites are steroids, flavonoids, stilbenes, and saponins; many of them exhibit potent analgesic, anti-inflammatory, antimicrobial, antioxidant, antiproliferative, and cytotoxic activities (Thu, Z.M., ET AL 2010). *Dracaena trifasciata* (Prain) Mabb., commonly known as mother-in-law's tongue, is used in the treatment of various ailments such as ulcers, jaundice, skin itches, urinary diseases, asthma, coughs, snake bites, and insect bites in folklore medicine (Babu, K., and Prabhu, D.S., 2023.). Phytochemical analysis of the whole plant of S. trifasciata has resulted in the isolation of 12 steroidal saponins and 4 pregnane glycosides, identified as 1β,2β-dihydroxypregna-5,16-dien-20-one-1-O-α-L-rhamnopyranosyl-(1→2)-O-[β-D-xylopyranosyl-(1→3)]. -β-D-glucopyranoside, 1β,2β-dihydroxypregna-5,16-dien-20-one1-O-α-L-rhamno-pyranosyl-(1→2)-O-[β- xylopyranosyl- (1→3)]-α-L-arabinopyranosid (Mimaki Y, I et al. 1997). Kasmawati et al. studied the inhibitory activity of S. trifasciata leaf extract against androgen receptors at molecular level using docking and dynamics studies with synthetic drug minoxidil. Their LC-MS/MS analysis identified 7 new compounds, among these three alkaloid compounds, viz. The extract was administered orally at a dose of 50, 100 mg/kg BW once a day for 15 days after diabetic induction by streptozotocin (STZ) (60 mg/kg BW). Glibenclamide (0.5 mg/kg) is a is a standard drug also given once a day for 15 days. The STZ-induced diabetic animals exhibited increased ROS production in cardiac tissue, which was found to be reduced with the treatment of leaf extract (Dey B. et al. 2014). The in vitro cytotoxic activity of S. trifasciata was studied in three different cell lines, viz., A-549, HepG-2, and CACO2. The various two-fold concentrations of alcoholic extract, i.e., 0, 3.9, 7.8, 15.6, 31.25, 62.5, 125, 250, and 500 µg/ml, were tested against these cell lines (El-Hawarya SSE et al., 2021). S. trifasciata root saponin extract and isolated compounds were tested for antibacterial activity against Staphylococcus aureus and Escherichia coli. The root extract and the isolated compounds showed potent antibacterial activity against tested bacteria, and the zones of inhibition were observed at 18.67 and 24 mm at 200 ppm concentrations (Dewatisari WF et al. 2017). An in vitro anthelmintic activity was studied in S. trifasciata leaf extracts against Fasciola hepatica. The experiment revealed that different concentrations of the extract caused the death of the parasites at different mean times (Wambugu FK et al. 2016). A study was conducted on the antioxidant activity of S. trifasciata ethanolic and aqueous leaf extracts by phosphomolybdenum and DPPH methods, and total phenolic content was also measured (Shelah M et al. 2018). The antiulcerative activity of S. trifasciata leaf ethanolic extract was evaluated in an indomethacin-induced (i.p., single dose) ulcer model (Wistar rats 40 mg/kg BW). The extract was tested at two different concentrations (200 and 400 mg/kg BW) twice daily for 7 days before indomethacin administration. The leaf extract-pretreated animals exhibited some improvement against ulceration (Ighodaro OM et al. 2017). Based on the above facts, the present work investigates the biosynthesis of sliver nanoparticles from the extract of Dracaena trifasciata by ecofriendly method, explores in vitro antioxidant activity by DPPH assay, and examines the anti-inflammatory activity by protein denaturation. Novel medicinal plants are enriched with potential bioactive molecules and exhibit broad-spectrum pharmacological activity. Biosynthesis of silver nanoparticles using ethanolic aerial part extract of *Dracaena trifasciata. The synthesis of nanoparticles by*

using plant extract is an eco-friendly method. The applications of silver nanoparticles in the field of biomedical science have been focused nowadays.

MATERIAL AND METHODS

Collection of samples :

Dracaena trifasciata aerial part were collected around theKG COP and RI Mrdicinal Garden, Tamilnadu for this investigation.

Method of preparation of samples :

The aerial part were grinned using of mortal and pestle. Grinned aerial part were stored at 24 hrs and concentrated the extract.Bio Reduction of AgNO3 by chemical constituents of extract was observed by color change from colorless to reddish brown in color

Pharmacological evaluation:

Preparation of Sliver Nanoparticle :

The fresh Dracaena trifasciata **(DTET)**extract solution was prepared by taking 10 g of thoroughly washed and finely cut leaves in a 300 mL Erlenmeyer flask along with 100 mL of sterilized double distilled water and then boiling the mixture for 5 min before finally decanting it. The extract was filtered through Whatman filter paper no 1 and stored at -15 °C and could be used within 1 week. The filtrate was treated with aqueous 1 mM AgNO3 solution in an Erlenmeyer flask and incubated at room temperature. As a result, a brown-yellow solution was formed, indicating the formation of silver nanoparticles. It showed that aqueous silver ions could be reduced by aqueous extract of plant parts to generate extremely stable silver nanoparticles in water. After read the absorbance with different nanometer 400 – 600nm.

In vitro DTET AgNps Antioxidant activity

Dracaena trifasciata **(DTET AgNps)**aqueous extract investigated for in vitro antioxidant activity by DPPH, ABTS, FRAP and NO for the estimation of anti-oxidant potential of Dracaena trifasciata ***(*DTET AgNps)**aqueous extract. Dracaena trifasciata **(DTTET AgNps)**me also tested by DPPH assay.

Determination of DPPH radical scavenging activity :

Antioxidant activity in the sample Dracaena trifasciata were estimated for their free radical scavenging activity by using DPPH (1, 1-Diphenyl-2, Picryl-Hydrazyl) free radicals (Brand-Williams et al., 1995). 100µL of SC extract was taken in the microtiter plate. 100µL of 0.1% methanolic DPPH was added to the samples and incubated for 30 minutes in dark condition. The samples were then observed for discoloration; from purple to yellow and pale pink were considered as strong and weak positive respectively. Read the plate on Elisa plate reader at 490nm. Standard ascorbic acid was used as reference. All the analysis was performed in triplicates and the average values were taken.

Radical scavenging activity was calculated by the following equation:

DPPH radical scavenging activity (%) = [(Absorbance of control - Absorbance of test sample) / (Absorbance of control)] x 100.

In-vitro DTET AgNps Anti-inflammatory activity - Inhibition of albumin denaturation:

The reaction mixture was prepared separately by mixing 0.5ml aqueous extract of DTET AgNps and its compounds A, B, and C (1mg/ml) with 0.45 ml aqueous solution of bovine albumin fraction (5%). The pH (6.3) of the solution was adjusted using a small amount of 0.1N HCl at 37 ˚C for 20 min, then heat to 57 ˚C for 30 min. Cool the solution and transfer it to the 96 well plates and measure the absorbance at

660nm. Standard was used as Diclofenac sodium (1000µg/ml) and the control contain 0.05ml distilled water. The percentage of inhibition of albumin denaturation was calculated by the following formula, Percentage of inhibition (%) = [(A control – A sample) / A control] x 100 Where A control – Absorbance of reaction mixture except drug. A sample – absorbance of the reaction mixture with the Sample.

Result and discussion:

Ethanol extract of Dracaena trifasciata has shown anti-inflammatory, antioxidant properties, and biosynthesis of sliver nanoparticles. Dracaena trifasciata synthesized AgNPs were initially confirmed by UV-visible spectrophotometer absorbance (SPR band) at 459 nm (0.441 OD). The SEM image (morphology) of the AgNPs shows spherical in shape. Dt ET AgNPs size range from 20-100 nm (Table **1) (Figs. 1).** Dracaena trifasciata DTET extract has shown in vitro antioxidant activity by DPPH assay in the current investigation. At DTET AgNps, the inhibition percentages are 80% (Table 2), compared to the standard ascorbic acid. As a result, even a low concentration of antioxidant activity is good compared to the standard ascorbic acid vitamin C. A previous paper reported that in vitro antioxidant activity of S. trifasciata was performed with the DPPH radical scavenging method using Vit-C as a positive control. The assays showed that the IC50 value of the crude extract was five times greater than that of vitamin C (Vivi A, Dwita LP, Istikomah 2019).

The inhibition of the albumin denaturation method was used to measure the anti-inflammatory activity in vitro. In comparison to standard diclofenac sodium, neither the crude extract DTET nor its separated constituents exhibit any appreciable anti-inflammatory efficacy. When compared to standard diclofenac sodium, the aqueous extracts of DTET exhibit moderate anti-inflammatory efficacy. DTET had a 17.59% (Table 3). While we were carrying out different concentrations in a dose-dependent way and comparing them with the standard, many of them showed the antioxidant and anti-inflammatory properties of DTET. A previous paper reported that S. trifasciata leaf extract hydrogel formulations and their wound healing activity were evaluated in the incision wound model (mice). When compared to the negative control, the 15% formulation had a higher closure area and concluded that S. trifasciata leaf extract has the potential wound-healing activity (Nia Y. et al., 2023). Overall investigation results, such as DTET AgNps, had significant antioxidant and no anti-inflammatory activity. The silver nanoparticle was prepared from an ethanolic extract of **Dracaena trifasciata,** and it was verified by UV analysis and color observation. The biosynthesis of DT ET AgNPs was characterized by FTIR and SEM analysis. The ethanolic extract DT ET prepared silver nanoparticle had significant anti-oxidant activity by DPPH assay and no anti-inflammatory activity.

Table 1: FTIR analysis

S.No	nm	Maximum absorbance (n=3)
1	400	0.25
2	430	0.24
3	500	0.25
4	640	0.23
5	600	0.19
		Max 400-450 nm

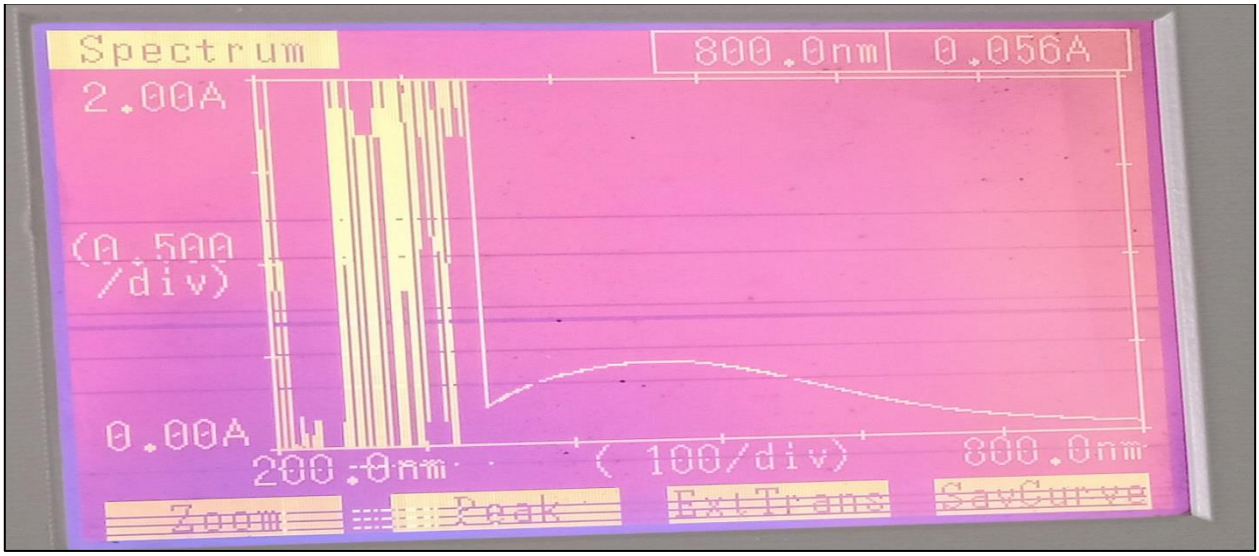
Table 2 : Invitro Antioxidant Activity

DT ET AgNPs				
S.NO	**COD**	**SOD**	**% inhibition**	**Average**
1	1.30	0.26	80	
2	1.20	0.27	79.21	
3	1.30	0.25	80.7	80%
Standard Vit C Ascorbic acid				87.64%
	0.34	0.04	88.24	
	0.34	0.04	88.24	
	0.34	0.05	85.29	

Table 3 : Invitro Anti-inflammatory activity by protein denaturation

DT ET AgNPs				
S.NO	**COD**	**SOD**	**% inhibition**	**Average**
1	-1.29	1	-51.480	
2	1	1	0	
3	-1.33	1	-57.812	17.59%
Standard Diclofenac				87.96%
	0.36	0.04	88.89	
	0.36	0.04	88.89	
	0.36	0.05	86.11	

Fig 1 : UV analysis



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