IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# SYNTHESIS, CHARACTERIZATION AND ANTIOXIDANT ACTIVITY OF SILVER NANOPARTICLES OF CAPPARIS DECIDUA

**Corresponding author-** Pranali N. Mali*, ,Namrata M. Chavan, Pooja G. Jadhav,

Suraj T. Jadhav.

Department of Pharmaceutics, Rajarambapu College of Pharmacy, kasegaon, Dist – Sangli, Maharashtra, India – 415404.

Department of Pharmaceutics, Vasantidevi Patil Institute of Pharmacy, Kodoli, Dist – Kolhapur (MH), India- 416114

**ABSTRACT :**

Now a days, in biomedical applications silver nanoparticles are of great interest. Nano particles are tiny materials having size ranges from 1 to 100 nm. The present study biological synthesis of silver nanoparticles by using Capparis decidua and identification of the antioxidant activity of the nanoparticles. Synthesized silver nanoparticles are characterized by UV visible spectrophotometer, FTIR. The antioxidant property of silver nanoparticles of Capparis decidua stem extract was checked by DPPH free radical scavenging activity.

**KEY-WORDS :** Silver nanoparticles of Capparis decidua, DPPH, FTIR, UV visible spectrophotometer

## INTRODUCTION:

Nanoscience and nanotechnology are the study and application of extremely small things and can be used across all the other sites of science, such as chemistry, biology, physics, materials science, and engineering. Nanotechnology is science, engineering, and technology conducted at the Nano scale, which is about 1 to 100 Nanometers. NPs having smaller particle size and greater surface area.[1] Commonly used silver nanoparticles are available in different shapes like triangular, spherical, but diamond, octagonal, and thin sheets are very popular. Synthesis of silver Nanoparticles is one of most the important area of research in nanotechnology[5] Antioxidant activity of the silver-materials containing Nanoparticles used in medicine to reduce oxidation of free radical.[8] This activity was tested by DPPH assay method based on reduction of DPPH as a stable free radicals which gives maximum absorption at

517 nm. When antioxidants that is AgNPs react with DPPH, the free radicals of DPPH combined and reduces concentration DPPH decreases absorption and increases the percentage inhibition activity.[2]

**METHOD AND MATERIALS _**

- **Preparation of 0.1 N AgNO3 Solution**:

16.98 gm of AgNO3 was dissolved in 1000 ml of distilled water.

- **Preparation of 0.1N HCL Solution:**

8.18 ml of HCL was dissolved in 1000ml of Distilled water.

- **Preparation of 0.1N KOH Solution:**

6gm of KOH was dissolved in 1000ml of distilled water.

**Preparation of Silver Nanoparticles:**

- 1 gm of Pure Capparis decidua extract + 100ml Water,
- Properly Boiled and maintained the temperature between 40-50$^0$ C,
- Pipette out 5ml Capparis decidua Extract + 45ml Silver Nitrate Solution,
- Observe change in colour,
- Add 0.1N KOH OR 0.1N HCL to adjust the pH of solution (PH range 8-12),
- Centrifuged at 10000 rpm for 15 min,
- Stand for 24 hr for settlement of AgNPs,
- Reduction of silver salt studied using FTIR.

**CHARACTERIZATION:**

UV visible spectroscopy analysis:

To determine absorption spectra and wavelength of synthesised AgNPs is carried out by using Systronic model of UV visible spectrophotometer. The range of wavelength was found in between 200nm to 800nm.

**FTIR measurement:**

To detect the functional group in AgNPs FTIR was performed on Jasco FT/IR Model-4700system. Small quantity of sample was placed in sample holder and IR spectra was measured.

**DPPH ( 2,2-diphenyl-1-picrylhydrazyl) free radical scavenging activity:**

- Preparation of reagent (0.004%w/v):

4mg of DPPH + 100ml of 95% ethanol

- Preparation of standard ascorbic acid

2mg ascorbic acid + 2.5ml of distilled water (800µg/ml)

(prepare different dilutions- 25 µg/ml, 50 µg/ml, 100 µg/ml, 200 µg/ml, 400 µg/ml)

- Prepare stock solution:

4mg extract + 10ml ethanol ( 400 µg/ml)

(prepare different dilutions- 10 µg/ml, 20 µg/ml, 30 µg/ml, 40 µg/ml, 50 µg/ml)

- Preparation of control:

3ml DPPH + 2ml ethanol.

**Procedure for DPPH assay method:**

1. 2ml stock solution of different dilutions.
2. Add 3ml reagent of DPPH in each above dilutions
3. Incubate at room temperature for 30 min.
4. Check absorbance at 517nm
5. Calculate % inhibition activity

   **% Inhibition= [($A_0$-$A_1$)/$A_0$] x 100**

   (Where, $A_0$ = absorbance of the control,A =absorbance of extracts/standard.)
6. Plotted graph of % inhibition activity v/s conc

**RESULTS :**

UV visible spectrophotometric analysis :_Majorly UV visible spectroscopy is used for the analysis of nanoparticles. The $\lambda_{max}$ of synthesized silver nanoparticles of stem extract of Capparis decidua was found to be 265.5nm which corresponds to the absorbance of silver nanoparticles.

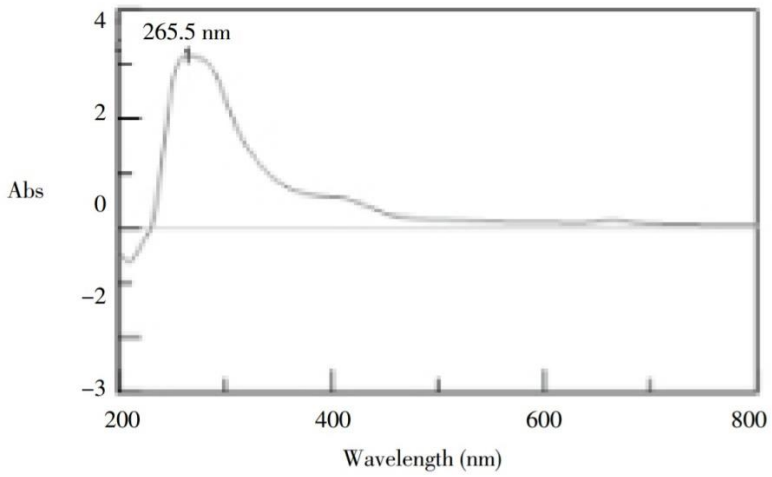



Fig no. 1 UV absorption spectrum of synthesized Silver nanoparicles

**FTIR Analysis:**

IR spectra of silver nanoparticle of Capparis decidua

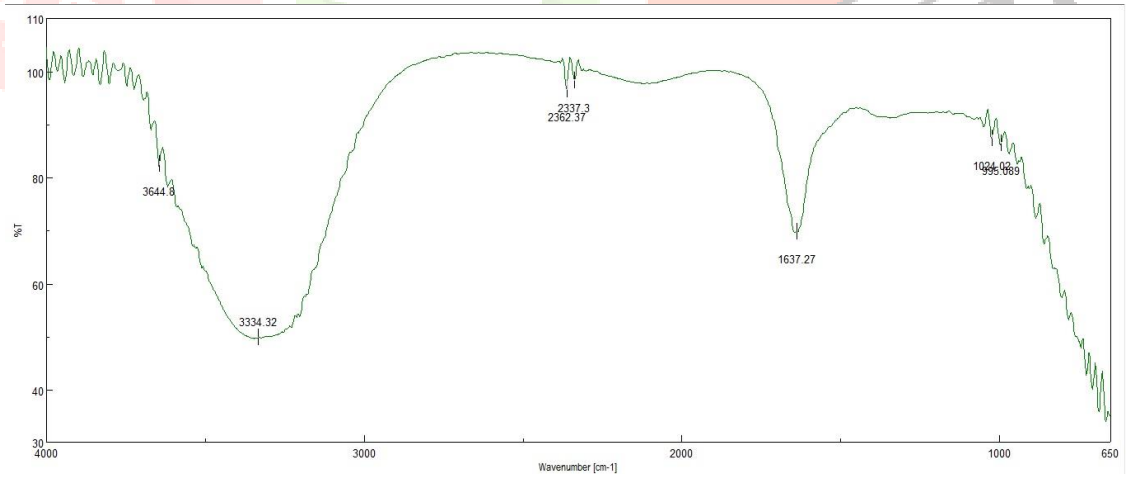


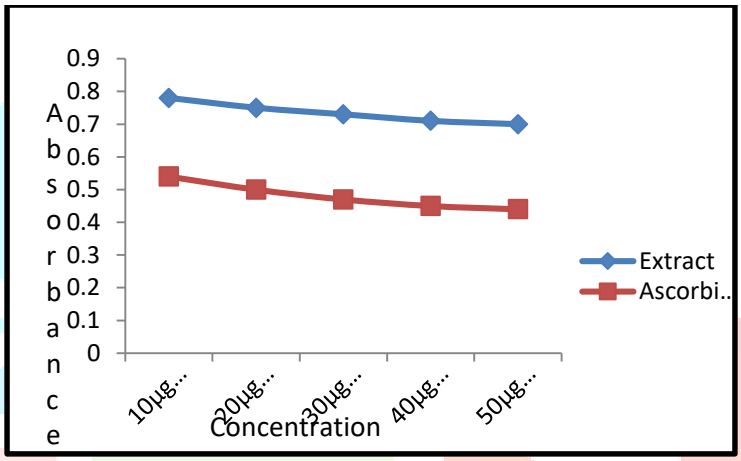

**Fig no. 2 FTIR analysis of silver nanoparticle of Capparis decidua**

**DPPH activity:**

- **Absorbance:**

**Table no.1 Absorbance of different concentration**

| Concentration (µg/ml) | Absorbance | |
|---|---|---|
| | Ascorbic acid | Extract |
| 10 | 0.54 | 0.78 |
| 20 | 0.50 | 0.75 |
| 30 | 0.47 | 0.73 |
| 40 | 0.45 | 0.71 |
| 50 | 0.44 | 0.70 |

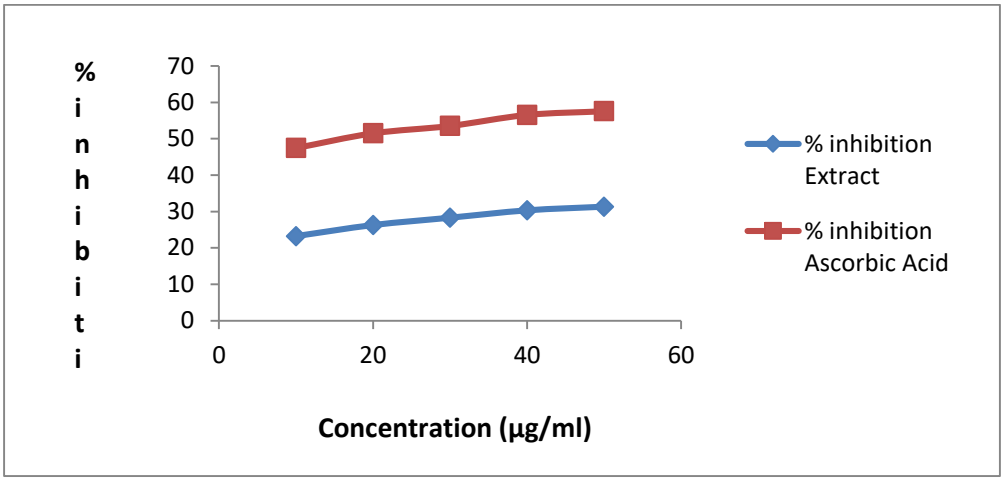



**Graph no. 1 Absorbance of different concentration**

- **% Inhibition activity :**

**Table no.2 % Inhibition of different concentration**

| Concentration (µg/ml) | % Inhibition | |
|---|---|---|
| | Extract | Ascorbic acid |
| 10 | 23.23 | 47.47 |
| 20 | 26.26 | 51.51 |
| 30 | 28.28 | 53.53 |
| 40 | 30.30 | 56.56 |
| 50 | 31.31 | 57.57 |




**Graph no. 2 % Inhibition different concentration**

**Discussion :**

**Acknowledgment** : We are very thankfull to our Principal Dr. C.S.Magdum sir and Vice Principal Dr. S.K. Mohite sir for providing facilities for project work. We are also very much thankfull to our expert Dr. S. R. Kane sir who guide us.

**Abbreviations** :

- AgNPs _ silver nano particles
- pH _ hydrogen ion concentration
- % _ percentage
- $\lambda_{max}$ _ maximum wavelength
- DPPH _ 2,2-diphenyl-1-picrylhydrazyl

**REFERENCES:**

1. Albrecht MA, Evan CW, Raston CL. Green chemistry and the health implications of nanoparticles. Green Chem, 2006; 8: 417-432.
2. .https://www.researchgate.net/publication/285525623_Antioxidant_Activity_by_DPPH_Radical_Scavenging_Method_of_Ageratum_conyzoides_Linn_Leaves
3. Dr. Somkant V. Jawarkar1, Sanmati D Shete, Dr. Sandeep R. Kane, Green synthesis of silver nanoparticles using *Bacopa monnieri* leaf extract and assessment of their DPPH activity, 2019
4. Patel R.M, Patel N.J, In vitro antioxidant activity of coumarin compounds by DPPH, superoxide and nitric oxide free radical scavenging methods. Journal of advanced pharmacy education & research, 2011;1: 52-68.
5. .Koleva, I.I, Beek, T.A. Screening of Plant Extracts for Antioxidant Activity: a Comparative Study on Three Testing Methods. Phytochemical analysis, 2002: 13: 8-17

6. Fulya Gulbagca , Sadin Ozdemir , Mehmet Gulcan , Fatih Sen. Synthesis and characterization of Rosa canina-mediated biogenic silver nanoparticles for anti-oxidant, antibacterial, antifungal, and DNA cleavage activities, 2019
7. B. Kumar, K. Smita, L. Cumbal, Biosynthesis of silver nanoparticles using lavender leaf and their applications for catalytic, sensing, and antioxidant activities Nanotechnol. Rev. 5 (2016) 521–528.
8. Shohreh Fahimirada,, Fatemeh Ajalloueianb, Mansour Ghorbanpourc, Synthesis and therapeutic potential of silver nanomaterials derived from plant extracts (2019) 260-278.
9. Nizar Tlili , Walid Elfalleh , Ezzeddine Saadaoui , Abdelhamid Khaldi ,Saida Triki , Nizar Nasri, The caper (Capparis L.): Ethnopharmacology, phytochemical and pharmacological properties, (2011) 93-101.
10. Shilpi Srivastavaa,b, Atul Bhargavaa, Neelam Pathakb, Prachi Srivastavaa Production, characterization and antibacterial activity of silver nanoparticles produced by Fusarium oxysporum and monitoring of proteinligand interaction through in-silico approaches, (2019) 136-145.
11. Ahmed, M, Saeed, F, et al, Evaluation of Insecticidal and Antioxidant activity of selected Medicinal plants. Journal of Pharmacognosy & Phytochemistry, 2013; 2(3), 153-158.
12. Patel R.M, Patel N.J, In vitro antioxidant activity of coumarin compounds by DPPH, superoxide and nitric oxide free radical scavenging methods. Journal of advanced pharmacy education & research, 2011;1: 52-68.
13. Ibrahim Khan a,*, Khalid Saeed b, Idrees Khan c Nanoparticles: Properties, applications and Toxicities (2019) 12, 908–931
14. Taniguchi N, editor. On the basic concept of nano-technology. Proc Intl Conf Prod London 1974. British Society of Precision Engineering; 1974
15. Maxwell SJ, Prospects for the use of antioxidant therapies. Drugs, 1995; 49: 345–361.
16. Permender Rathee, Dharmender Rathee, Deepti Rathee, Sushila Rathee, In-vitro cytotoxic activity of -Sitosterol triacontenate isolated from Capparis decidua (Forsk.) Edgew, Asian Pacific Journal of Tropical Medicine, (2012)225-230
17. Kregel CK. Zhang JH. An integrated view of oxidative stress in aging: Basic mechanisms, functional effects, and pathological considerations. Am J Physiol Regul Integr Comp Physiol, 2007;292:18–36.