Qualitative Phytochemical screening and Green synthesis of Silver nanoparticles by *Murraya Koenigii* L. Spreng

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Abstract - *Murraya koenigii*, generally known as 'karipatta' or as curry leaf in India. It is a health promoting herb,which is not only used for flavor and aroma, but also has many potential health benefits. We report here the synthesis of silver nanoparticles (AgNPs) using curry leaves and also qualitative phytochemical screening test was performed to confirm their presence in curry leaves. Green synthesized nanoparticles have been characterized by color change and UV-Vis spectroscopy. The color of leave extract prepared turned from green to brown after treatment with $AgNO_3$ (1mM). The UV-Visible spectroscopic analysis showed absorbance peak at 434 nm. Curry leaf extract as a reducing agent converts silver ions to AgNPs in a rapid and ecofriendly manner. Green synthesis has advantage over chemical and physical method as it is cost effective, environment friendly, easily scaled up for large scale synthesis and also in this method there is no need to use high pressure, energy, temperature and toxic chemicals.

Keywords: Curry leave,Green synthesis,Phytochemical screening, Silver nanoparticles

I. INTRODUCTION

Nanotechnology is defined as; 'The application of science that deals with elements in the range of 100 nanometers to one tenth of a nanometer

in size'. Metal nanoparticles have a unique thermal, magnetic, electronic and optical properties, these properties are governed by their size, shape and composition. Metal nanoparticles (AgNPs) are more effective because they have very high surface volume ratio as a result large proportion of silver atoms are in direct contact with their environment [1]. Metal nanoparticles have been used in many fields like medicines, electronics, agriculture etc. as it has many beneficial properties.

There are several methods for preparing metal nanoparticles but now a day's use of conventional physical and chemical methods for making nanoparticles have limited because of toxic chemicals [2].Also, these methods required high energy input and costly processing [3].

Green synthesis is a method in which environmentally compatible material such as bacteria, fungi and plants are used for the synthesis of nanoparticles [4]. These are eco-friendly method [5]. Silver nanoparticles exhibit a unique property (e.g.,size and shape depending optical, electrical, and magnetic properties) and can be incorporated into antimicrobial applications, biosensor materials, composite fibers, cryogenic superconducting materials, cosmetic products, and electronic components. Various physical and chemical methods have been employed for synthesizing and stabilizing silver nanoparticles [6], [7].The main reaction that is occurring during biosynthesis of nanoparticle is reduction/oxidation.

Murraya koenigii, generally known as karipatta or as curry leaf in India. It belongs to the family Rutaceae which has 1600 species and more than 150 genera [8]. Distinctive aroma and medicinal benefits of *Murraya koenigii* makes it a valuable plant. Pgurjunene, P-caryophyllene, P-elemene and O-phellandrene are the major chemical constituents which plays an important role for its characteristic aroma. It is a rich source of carbazole alkaloids [9]. The paper demonstrated the qualitative phytochemical screening of curry leaves and synthesis of silver nanoparticles using curry leaves and synthesized nanoparticles have been characterized by color change and UV-Vis spectroscopy.

II. MATERIAL AND METHODS

Collection of Plant material

The fresh and healthy leaves of *Murraya koenigii*Spreng collected from organic farm of AmityUniversity campus sector 125, Noida Uttar Pradesh, India. Leaves were removed from stem and wash gently with tap water.

Preparation of extracts:

Leaves extract were extracted with ethanol at normal room temperature. *M.koenigii* leaves were drenched in 500ml of 99.9% ethanol for 3-4 days separately. The drenched leaves were filtered with Whatman No. 1 filter paper and extracts were collected. This method is repeated thrice and filtrates were collected. The rotary evaporator was used to concentrate the collected filtrates under vacuum and stored under 4℃ for further use [10].

A. Qualitative Phytochemical screening:

Qualitative phytochemical screening was done as per standard biochemical procedures. The preliminary tests for ethanol extracts were performed to confirm the presence of Alkaloids, Anthraquinones, Anthocyanins, Carbohydrates, Flavonoids, Glycosides, Phenols, Proteins and amino acids, Saponins, Steroids, Tannins and Terpenoid [11].

B. Biosynthesis of silver nanoparticle by leaf extracts of *M. koenigii*

Fresh leaves of *M. koenigii* (25 grams) were thoroughly washed in distilled water, dried and cutinto small pieces and boiled with 100ml of distilled water up to 15 minutes and filtered with Whatman No. 1 filter paper [12]. The filtrate was centrifuged at 10,000 rpm for 10 minutes and supernatant was collected and stored at 4 ℃ in refrigerator. The filtrate was used as reducing and stabilizing agent for the preparation of silver nanoparticles. The filtrate (50 ml) was added to the aqueous solution of 1 mM AgNO3 and mixture was incubated in a dark for 12 hours. After 12 hours, the sample was analyzed for its maximum absorbance using UV-visible spectrophotometer.

Detection of silver nanoparticles

Visual observation

After the treatment of leaf extract with AgNO3 (1 mM), the colour change of the reaction mixture
was visually observed.

UV–vis spectrophotometric analysis

The aliquots of reaction mixture were subjected to the measurement of absorbance by UV–visiblespectrophotometer at a resolution of 1nm from 250 to 800nm for the detection of Ag NPs.

III. RESULT AND DISCUSSION

The present study was conducted to assess the phytochemical constituents of *M.koenigii* leaves and effect of leaf extract of *M.koenigii*in reduction mechanismof silver ions into silver nanoparticles. The preliminary screening of the leaves of *M.koenigii*showed negative test only for tannin and showed positive result for other phytochemicals (Table I). These secondary metabolites may play a significant role in the formation of nanoparticles.

Table I : Phytochemical screening of ethanolic extract of curry leaves

S. No.	Phytochemical	Curry leaves Fresh extract
1.	Alkaloids	+
2.	Anthocyanins	+
3.	Carbohydrates	+
4.	Flavonoids	+
5.	Glycosides	+
6.	Phenols	+

7.	**Proteins & Amino Acids**	+
8.	**Saponins**	+
9.	**Sterols**	+
10.	**Tannins**	_
11.	**Terpenoids**	+

(+ -sign indicates the presence of phytochemical components; (-) sign indicates the absence of phytochemical components)

Theleaf extracts of *M. koenigii* were analyzed for the synthesis of silver nanoparticles which were characterized with the help of UV-visible absorption spectroscopy. In the present study when the leaf extract was treated with AgNO3 (1mM) and incubated in darkness at room temperature, within 12 h of the reaction, colour changes from green to brown (Figure 1a and 1b), indicating the formation of Ag NPs. Change in colour was due to the excitation of surface plasmon vibrations in the metal nanoparticles [1].

1(a) 1(b)

Figures: 1(a) control leaf extract; 1(b) leaf extract after treatment with 1mM of AgNO3 solution.

Optical absorption spectroscopy is a very useful technique for the analysis of nanoparticles. In order to verify the synthesis of Ag NPs, the test samples were subjected to UV–vis spectrophotometric analysis. The test samples (leaf extract treated with 1mM of AgNO3) were collected in aliquots from the reaction mixture and analyzed to record their absorbance by UV–vis spectrophotometer. This analysis showed the sharp absorbance at around 420nm (Figure 1 c), which was specific for Ag NPs [13], [14]. Similar results were observed with sun dried leaf extracts of *C. camphora* and *C. annuum* which were treated with aqueous silver ions, the reaction mixture containing Ag NPs showed the absorption peak at about 420nm due to the excitation of plasmon resonance vibration [15], [16].

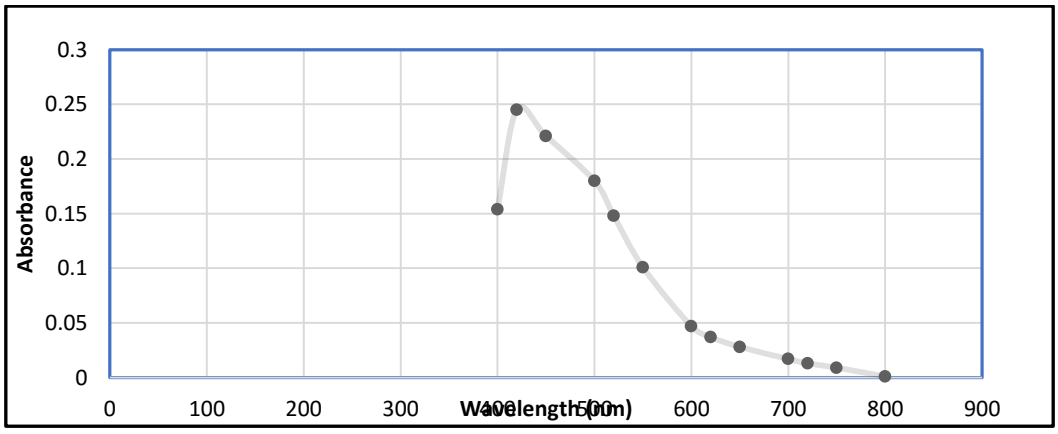

Figure 1 (c)

IV. CONCLUSION

The biosynthesis of silver nanoparticles with the leaf extracts of *Murraya Koenigii* is simple, cost effective and ecofriendly method. The present study reveals that curry leaves are an excellent source for the synthesis of silver nanoparticles but further clinical trials are required for its medicinal uses against diseases.

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