ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.ijrps.com

Free radical scavenging activity of Maranta arundinacea assisted selenium nanoparticles

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Article History:

Received on: 21 Mar 2020
Revised on: 22 Apr 2020
Accepted on: 30 Apr 2020

Keywords:

Selenium nanoparticles,
Antioxidant,
green synthesis,
Plant

ABSTRACT

Selenium nanoparticles have role in toxic waste removal and bioremediation. In a recent study, biosynthesis of many metal and metal oxide nanoparticles by different plant extracts was found to be stable even after wet heat sterilization process. In some studies, biosynthesis of silver, gold, and selenium nanoparticles using microorganisms and plant and parts. In this present study we have synthesized selenium nanoparticles using arrow root and analysed for its free radical scavenging activity. 20 mM of sodium selenite was prepared using 60 mL of distilled water and 40 mL of Arrowroot extract. It was kept in the shaker. Readings were taken for 3 days. Centrifugation was done at 8000 rpm. Pellet was collected and was used for antioxidants activity that is free radical scavenging activity. The antioxidant property of arrow root mediated selenium nanoparticles are comparatively higher than the standard antioxidant property. Calculations were done on the basis of reading that was obtained. This study proves that there is antioxidant activity that is free radical scavenging activity adopted by selenium nanoparticles extracted from arrow root.

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ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11i3.2630

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INTRODUCTION

Maranta arundinacea belongs to the family Marantaceae. In indonesia local crop food potentially to be developed as carbohydrate food and functional food which is underutilized in Arrow root. One study shows that arrowroot containing diet extracts mice has increased IgG, IgA and IgM serum level. It shows that arrowroot has in vivo and in vitro immunostimulatory effects (Kumalasari *et al.*, 2012).

Proper functioning of human body and good health is Selenium which is an important trace mineral for maintenance. It forms selenoproteins and with the cooperation of proteins which are important antioxidant enzymes. For prevention of cellular damage form free radicles, selenoproteins are used. Regulation of thyroid function and proper functioning of immune system is done by selenoproteins (Srivastava and Mukhopadhyay, 2013). Photoelectric and semiconductor property is possessed by selenium nanoparticles. It was prepared by chemical reduction (Shin *et al.*, 2007). In medicine, high biological activity and low toxicity is demonstrated by selenium nanoparticles (Menon *et al.*, 2018, 2020).

The nanoparticles effect depends on the size and that depends on concentration, reaction temperature and pH. pH condition lower than 10 is facilitated by nanoparticles synthesis. Selenium nanoparticles have role in toxic waste removal and bioremediation (Rajeshkumar, 2016). In a recent study, biosynthesis of many metal and metal oxide nanoparticles by different plant extracts was found to be stable even after wet heat sterilization process (Rajeshku-

mar and Bharath, 2017). In some studies, biosynthesis of silver, gold, and selenium nanoparticles using microorganisms and plant and parts (Agarwal *et al.*, 2018; Rajeshkumar and Naik, 2018).

Many antioxidant compounds are nanoparticles mediated by many plants and these compounds protect cells against the damaging effects of reactive oxygen species, singlet oxygen, superoxide, peroxyl radicals, hydroxyl radicals are such reactive oxygen species that leads to cellular damage and results in oxidative stress (Chellakannu *et al.*, 2019; Menon *et al.*, 2017; Rajeshkumar, 2017).One study shows, an eco-friendly biosynthesis of selenium nanoparticles using Vitis vinifera (raisin) (Sharma *et al.*, 2014). In this present study we have synthesized selenium nanoparticles using arrow root and analysed for its free radical scavenging activity.

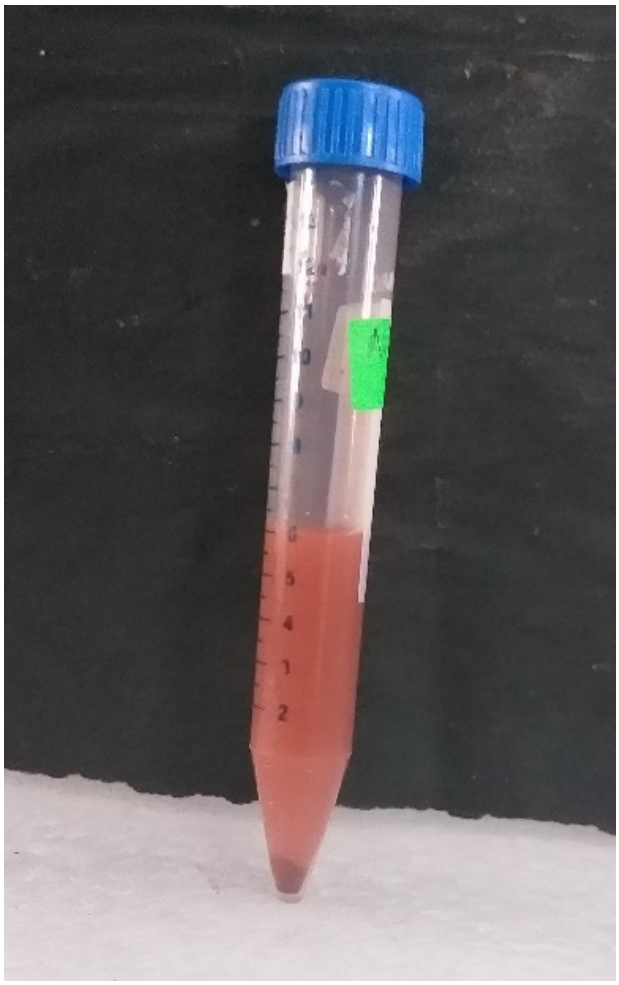

Figure 1: Selenium nanoparticles

MATERIALS AND METHODS

Preparation of *Maranta arundinacea* extract

Arrow root extract were taken and was 100ml of distilled water were added to the extract. It was boiled for 5 minutes. Filtration was done and it was used for nanoparticles synthesis.

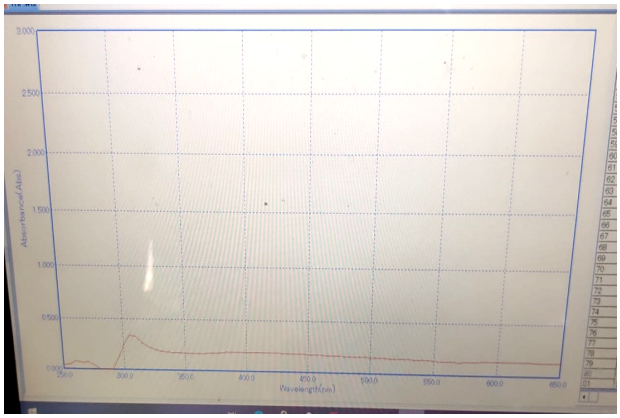

Figure 2: UV-vis spectroscopic analysis

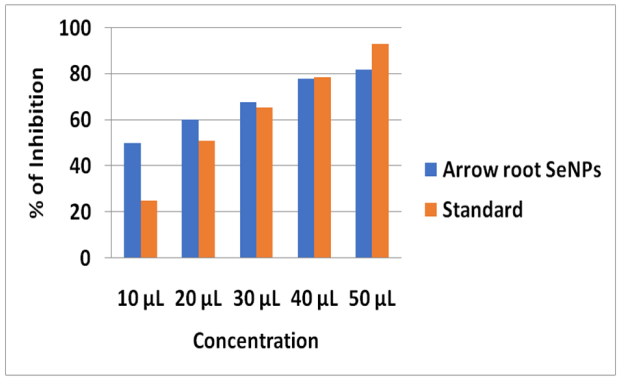

Figure 3: Antioxidant activity of SeNPs

Synthesis of nanoparticles

For selenium nanoparticles synthesis, 60ml of water was added in 0.519g of sodium selenite. Filterate was added. 40mL of extract was ready. It was kept in the shaker. Readings were taken for 3 days. Centrifugation was done at 8000rpm. Pellet was collected and was used for antioxidants activity that is free radical scavenging activity.

Antioxidant Essay

Blois discovered DPPH(2,2-diphenyl-1-picryl-hydrate) test. One milliliter of the fraction solutions was added to 1ml of a DPPH solution in ethanol. At room temperature and after 30 minutes, 517 nm was measured as the absorbance of solution. The free radical scavenging activity was determined by comparing its absorbance with that of no sample.Antioxidant essay was calculated using the following equation:

DPPH scavenging activity, Antioxidant essay (%) = (A0 – A1) /A0 ×100

Where A0 is the absorbance of the control and A1 is the absorbance of the sample.

RESULTS AND DISCUSSION

Visual observation

Arrow root extract were taken and in extract 100ml of extract was added. It was boiled for 5 minutes. Filteration was done. 60ml of water was added in 0.519g of sodium selenite. Filterate was added. 40ml of extract was ready. It was kept in the shaker. Readings were taken for 3 days. Centrifugation was done at 8000rpm. Pellet was collectedFigure 1.

UV-Vis Spectroscopic

Selenium nanoparticles was characterized by UV-Vis spectroscopic analysis between wavelength of 250 to 650nm. The peak was seen at around 310nm Figure 2 which represents the presence of selenium nanoparticles formed by reduction of selenium ion to elemental selenium.

Antioxidant activity

From the above graph, the antioxidant property of arrow root mediated selenium nanoparticles is comparatively higher than the standard antioxidant property. Calculations were done on the basis of reading Figure 3 that was obtained. The nanoparticles were actively involved in the antioxidant activity when compare with the plant extracts (Fesharaki *et al.*, 2010).

CONCLUSIONS

In this present investigation, we synthesized selenium nanoparticles using *Maranta arundinacea root extract and checked its free radical scavenging activity using DPPH assay.* This study proves that there are antioxidant activity that is free radical scavenging activity adopted by selenium nanoparticles extracted from arrow root.Based our results the arrow root mediated selenium nanoparticles will used for many biomedical applications such as anticancer activity, antiviral and antibacterial activity against many disease causing pathogens.

Conflict of interest

None.

Funding support

None.

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