WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.074
Volume 7, Issue 16, 327-330. Review Article ISSN 2277– 7105

BIOSYNTHESIS OF IRON NANOPARTICLES USING PLANT EXTRACTS MINI REVIEW

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Article Received on
29 June 2018,

Revised on 19 July 2018,
Accepted on 09 August 2018

DOI: 10.20959/wjpr201816-13160

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ABSTRACT

In this review discussed about biosynthesis of iron nanoparticles using plant extract. In the recent development various plant materials used for nanoparticles synthesis. Such as several plant and plant parts extract have used as reducing and capping agents for synthesis of nanoparticles. The process environmental friendly and simple is not only green, economic, non toxic rapid synthesis also consider as good alternative for chemical method.

KEYWORDS: Biosynthesis, iron Nanoparticles, Plant Extract.

INTRODUCTION

The interest in synthesizing Nanoparticles in an easy and environmental friendly way has been increasing in the recent years. Physical and Chemical methods are conventionally used for synthesis of Nanoparticles, however due to limitations of these methods, the focus of research has been recently shifted towards the development of clean and eco-friendly synthesis protocols. The green synthesis of Iron Nanoparticles has been achieved using environmental acceptable plant extract. It was observed that Camellia sinensis leaf extract can reduce Iron ions into Iron Nanoparticles at room temperature.[1] Green synthesis of iron nanoparticles is evolving as a method that would impart steric stabilization of iron nanoparticles against aggregation, and help overcome the concerns related with using sodium borohydride as a reducing agent in routine synthesis reported so far. This chemical is known for its corrosiveness and flammability.[2] Recently, successful synthesis of iron nanoparticles utilizing green tea leaf and sorghum bran extracts have been reported.[2,4] Nowadays, efforts are made towards the biosynthesis of nanomaterials because chemical methods cause serious environmental

problems. Nanomaterials can be synthesized intra- and extra-cellularly by unicellular. Nanomaterials are synthesised by plant extract. Recently Pattanayak et al. were able to synthesize spherical Fe nanoparticles with a mean particle size of 100 nm via leaf extracts taken from Azadirachta indica (Neem).[5] And a short time ago Shah et al. were able to synthesise Fe nanoparticle via extracts taken from plants such as Euphorbia milii, Tridax procumbens, Tinospora cordifolia, Datura innoxia, Calotropis procera, and Cymbopogon citratus (lemon grass tea). The smallest spherical nanoparticles size range (13 to 21 nm) were synthesized from the stem extract taken from Euphorbia milii and the widest size range (43–342 nm) occurred for particles synthesized using leaf extracts taken from Cymbopogon citratus.[6]

Biosynthesis of nanoparticles using plant extract

Synthesis and characterization of amorphous iron oxide nanoparticles from iron sals in aqueous extract of Hordeum vulgare and Rumex acetosa plant have been reported.[7] Also study sustainable green chemistry approach was established to fabricate magnetic Fe3O4 nanoparticles (Fe3O4NPs) using the aqueous fruit extract of edible C. guianensis (CGFE).[8] Sageretia thea (Osbeck.) was used as an effective chelating agent for the biosynthesis of iron oxide nanoparticles (IONP's) and extensively characterized through XRD, FTIR, Raman spectroscopy, Energy Dispersive Spectroscopy, HR-SEM/TEM and SAED. Antibacterial assays against five human pathogenic bacterial strains were carried out and minimum inhibitory concentrations were calculated.[9] Camellia-sinensis-mediated IONPs indicated four times larger surface area relative to the commercial ones.[10] Lawsonia inermis, Amaranthus dubius, Rosmarinus officinalis, Melaleuca nesophila, Padina pavonica, etc., are some of the other medicinal plants being effectively used in the biosynthesis of IONPs.[11] Furthermore, these green IONPs were found to be nontoxic to human beings when compared to their chemically produced counterparts and also indicated higher biocompatibility and impressive antimicrobial properties.[12,14]

Future Prospective

Iron nanoparticles are most attractive maerials for variety of applications in catalysts, environmental and other fields etc. The present review summerises biosynthesis of iron nanoparticles using pant extract. Biosynthesis iron nanoparticles are very useful not only because of its ecofriendly also economical simple and rapid processes. Plant extract may act as a reducing and stabilising agent. Syntheses of iron nanopartiles using plant extract have

advantage over the other physical methods safe, eco-fiendly, rapid and simple to use. Plant materials have huge potential for the production of iron nanoparticles of wide applications with the desired shape and size. A detailed study is required to give a biosynthesis of iron nanoparticles using biomolecules present in plant materials which will be valuable to improve the properties of iron nanoparticles.

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