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Synthesis of *Leucaena* mediated silver nanoparticles: Assessing their photocatalytic degradation of Cr (VI) and *in vitro* cytotoxicity against DLA cells

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ABSTRACT

The development of dependable, environmentally benign methods for the synthesis of nanoscale material is an important concern of nanotechnology. In this work, it explores and finds the synthesis of highly dispersed silver nanoparticles (Ag-NP's) with the help of *Leucaena Leucocephala* leaf extract (LLLE) as reducing agent. The synthesized Ag-NP's was characterized by Fourier Transform Infrared spectroscopy (FT-IR), UV–vis Spectroscopy (UV–vis), X-ray diffraction (XRD) studies, Transmission Electron Microscopy (TEM), Scanning Electron Microscopy (SEM) and Energy Dispersive X-ray spectroscopy (EDX). Moreover, the synthesized Ag-NP's show the circular shape with average particle size of 40 nm. Also the synthesized Ag-NP's show better activity towards degradation of aqueous hexavalent chromium solution under visible light irradiation. Brunauer-Emmett-Teller (B.E.T) surface area analysis was done to explain the photodegtadation of chromium in aqueous solution. The short term *invitro* cytotoxicity of the biosynthesized Ag-NP's was tested against DLA cell lines using trypan blue dye exclusion technique and thus the synthesized Ag-NP's show 100% inhibition with concentration of 100 μg/ml.

1. Introduction

Metal nanoparticles find applications in various fields such as medicine, material science, and pollution control and so on. Various strategies are employed for synthesis of metal nanoparticles particularly silver nanoparticles including physical, chemical and biological methods. Subsequently chemical methods based on simple procedures use chemical reducing agents which are toxic for living organisms and make them unfit for medicinal use. Among the various processes, biological processes based on bacteria, fungi, plant extracts, bio-derived components are preferred as it does not employ toxic chemicals, ecofriendly and has better morphological control of nanoparticles [1,2]. So there is an urgent need to develop ecofriendly biological way of synthesizing nanoparticles. Silver nanoparticles have long lasting inhibitory activity against various microbes and also against human pathogens [3]. Kim et al. reported antifungal activity of biologically synthesized silver nanoparticles [4]. Anti-inflammatory activity of Ag-NPs was reported by Nadworny et al. [5]. Similarly extensive research has been carried out on anti-viral activity [5], anti-angiogenesis [6] and anti-platelet activity [7]. Chemotherapy [8] is one of the important methods for the treatment of cancer. However, there are certain drawbacks of using chemotherapy because of its inability to differentiate between normal and cancer affected cells. Dalton's ascites lymphoma [9] is transplantable, cancer cells appearing as lymphocytes in mouse. Previous reports on *in vitro* cytotoxicity studies provide data where it helps to identify plant extracts with potential antitumor properties for the future work [10–14]. Literature survey reports shows that biosynthesized Ag-NP's was found to have excellent activity against several microbes and dental pathogens [15–19]. Cr (VI) is also one of the heavy metal contaminant in water released by Electroplating, leather tanning, and textile industries. Cr (VI) has high solubility in water.

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