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Short Communication

Endogenic mediated synthesis of gold nanoparticles bearing bactericidal activity

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ABSTRACT

The present investigation aimed to synthesize gold nanoparticles using *Pseudomonas fluorescens* 417 inhabiting *Coffea arabica* L. Biologically synthesized gold nanoparticles were polydispersed in nature and characterized using hyphenated techniques such as UV-visible spectrophotometry, which ascertained characteristic peaks between 450 nm and 650 nm. Fourier transform infrared analysis predicted the functional groups present in the cell-free supernatant that mediated the synthesis and stabilization of gold nanoparticles. The crystalline nature of the gold nanoparticles was analyzed with X-ray diffraction techniques that displayed the Bragg's diffraction intensity. Transmission electron microscopy revealed the size of nanoparticles ranging from 5 nm to 50 nm, with most of them bearing a spherical shape. The study also revealed the bactericidal activity of synthesized nanoparticles against a panel of clinically significant pathogens. Maximum activity was observed against *Pseudomonas aeruginosa* followed by *Escherichia coli*, *Staphylococcus aureus*, *Bacillus subtilis*, and *Klebsiella pneumoniae*. The results obtained in the present investigation are promising for ecofriendly approaches for synthesis of gold nanoparticles bearing bactericidal activity that can act as an alternative to combat drug-resistant pathogens.

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1. Introduction

Use of nanomaterials can be traced from ancient times, but in recent times, their application and importance has increased [1]. Availability of technical resources and advances in scientific domains has led to emergence of nanotechnology and application of nanomaterials [2]. These nanomaterials have superior properties compared to their bulk counterparts. In recent years, nanomaterials

have become a subject of interest among the scientific community, with many applications being explored. However, strict regulations have resulted in a decline in the use of these nanomaterials in biomedical applications. Their synthesis protocols involve the use of toxic materials, generate a lot of heat, and often require sophisticated infrastructure, which are barriers for many studies [3]. In order to overcome the limitations posed by these conventional methods, there has been a growing demand to develop ecofriendly and rapid synthesis of nanomaterials with the desired size and shape. Consequently, researchers have developed biogenic principles to synthesize nanomaterials by using biological resources such as plants and microorganisms or their products [4]. The use of biological entities is linked to their phyto- and bioremediation activities, and their ability

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